

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

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MARCH 9, 1987

► DEREGULATION

MCI urges free rein for AT&T

Seeks BOC constraints.

BY KARYL SCOTT

Washington, D.C. Correspondent

WASHINGTON, D.C. — MCI Communications Corp. last week called for the total deregulation of arch rival AT&T and urged federal regulators to direct their attention to controlling the increasingly powerful Bell operating companies.

MCI comments were part of a filing with the Federal Communications Commission regarding an FCC proposal to streamline regulation of services offered by AT&T and the BOCs. AT&T, US Sprint Communications Co. and others, including key users groups, also filed responses last week to the FCC proposal.

MCI's filing went beyond the realm of the FCC's proposal by advocating total deregulation of AT&T and increased regulation of the BOCs. That was an about-face for MCI, which has long challenged AT&T in the courts and at the FCC in an effort to hold the long-distance giant at bay while trying to make inroads into AT&T's core long-distance business.

MCI said regulations, particularly rate-of-return regulations, are hurting the entire interexchange market. Rate-of-return regulations forced AT&T to cut long-distance rates by roughly \$3 billion over the last year, MCI officials claimed. AT&T's competitors have had to follow suit to remain competitive, but their profits have suffered as a result.

MCI thinks removal of the regulations governing AT&T would arrest this trend and possibly even result in AT&T rate hikes. That would

See **MCI** page 44

► HANNOVER FAIR

IBM backs X.400, stays clear of demo

BY PAUL KORZENIOWSKI

Senior Editor

HANNOVER, West Germany — IBM last week introduced its first software compatible with the X.400 international messaging standard at the massive Hannover Fair CeBIT '87 international trade show, but was conspicuously absent from a multivendor demonstration de-

signed to show the usefulness of that standard.

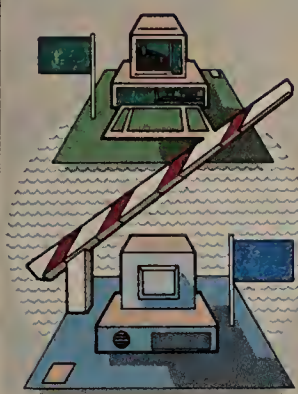
CeBIT, a German acronym for the World Center for Office Data and Telecommunications Technology, hosted 2,100 exhibitors representing 37 countries and a packed house of roughly 350,000 attendees.

A day before the show opened, IBM introduced software conforming to the application

See **IBM** page 44

Big headaches for international network users

Managers running worldwide networks cite these common problems



- Spotty circuit quality and availability
- Tight restrictions governing use of private network gear
- Installation delays that can run longer than a year
- Finding and working with appropriate local officials
- Burdensome and complex paperwork requirements, including filing export and import licenses for equipment used on foreign nets
- Understanding local laws regulating international data flow
- Keeping current with regulatory and technological developments in a myriad of countries

► INTERNATIONAL

Global net users face odd perils

BY MARY PETROSKY

West Coast Correspondent

When a worker at one of Texaco, Inc.'s facilities along the west coast of Africa needs to make an important telephone call, a helicopter is pressed into service to ferry him to an off-shore oil drilling rig to place the call via satellite at a cost of \$10 a minute.

See **Global** page 45

NETWORK LINE

News

Like father like son: Contel ASC is taking after the acquisitive ways of parent Contel Corp. by landing an option to acquire roughly 20% of troubled VSAT vendor Equatorial. Page 2.

The FCC will decide this month whether to allow the BOCs to provide protocol conversion as part of their basic network services, a de-

cision that could have far reaching effects on vendors and users. Page 2.

Novell's wide-area net tools are just what Europe asked for: gateways linking local networks to X.25 packet-switched nets. Page 2.

The Network Computing Forum puts the weight of 31 companies behind its pledge to promote standards that enable networked devices to share computing loads. Page 4.

Columbia University dumps Centrex and awards a \$13 million contract to an IBM/Rolm team for a digital campus network built around Rolm's new high-end 9000AE. Page 4.

Users complaining of service nightmares convince BOCs to revamp maintenance procedures to speed up and improve service. Page 6.

An AT&T team is one of many international telecom top guns vying for control of CGCT, the state-owned French telephone equipment maker. Page 8

Features

Job-hoppers, formerly considered bad risks, may have jumped ahead in experience, making them worth more to a company than the typical 30-year veteran. Page 30.

FEATURE FOCUS

SNA networking on the railroad

West Germany's trains roll with a modernized data net.

BY THOMAS W. McDONALD

Special to Network World

The Deutsche Bundesbahn, a West German government agency charged with providing country-wide railway service, began a project a few years ago to modernize its information systems and networks. A data processing system had already been put in place at the Bundesbahn's headquarters in Frankfurt, West Germany.

However, the bulk of the transactions associated with managing, maintaining and operating the rail system, which includes remote offices and railway stations that are spread throughout the agency's 10

See **All aboard** page 33

► SATELLITE INDUSTRY

Contel buys VSAT gear*Also gets stock option in Equatorial pact.***BY BOB WALLACE**
Senior Editor

ROCKVILLE, Md. — In dealings that gave Contel ASC an option to acquire roughly 20% of Equatorial Communications Co., the Contel Corp. satellite subsidiary last week said it had agreed to purchase \$10 million in Equatorial VSAT gear and loan the financially strapped company another \$6 million.

Contel ASC, the arm of Contel that offers custom satellite networks, plans to use the Equatorial gear to widen its own satellite network service offerings.

The expected infusion of Contel ASC cash comes at a critical time for Equatorial, which last week released its 1986 financial report showing a loss of \$67.8 million for

the year. Fourth-quarter losses of \$56.9 million included a \$45.2 million restructuring cost.

As part of its memorandum of understanding with Equatorial, Contel ASC also won the option to purchase 3.6 million shares of Equatorial's common stock. The company did not say whether it intends to exercise that option.

Contel ASC expects to use the Equatorial gear — which includes four master hub stations and an unspecified number of C-band very small aperture terminal antennas — to add muscle to its own domestic communications net services.

The company currently provides both large and small Ku-band earth stations and fiber-optic transmission facilities.

Contel ASC plans to collocate

the Equatorial C-band hub stations with its Ku-band hubs installed across the nation. The company said it will tie these hub stations together with \$12 million worth of fiber-optic facilities it is purchasing from Cable & Wireless North America, Inc. ("Carriers outline plans, service progress at TCA," NW, Sept. 29.) In the event of a hub station failure, user voice and data traffic would be routed over the fiber to a second hub station.

According to Bill Rahe, vice-president of the enterprise network strategy program of Gartner Group, Inc., a Stamford, Conn.-based consulting firm, "Now Contel ASC can offer users solutions for high-speed applications and also equipment geared for low-speed applications."

Contel ASC's VSAT product, which is designed to transmit voice and data at 56K bit/sec and receive video signals, is more expensive than Equatorial's VSATs, which support data transmission at speeds up to 4.8K bit/sec, he ex-

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► ENHANCED SERVICE

FCC to rule on protocol conversion*Action won't please all sides in debate.***BY MICHAEL FAHEY**
Staff Writer

WASHINGTON, D.C. — The Federal Communications Commission is expected to decide this month if the Bell operating companies should be allowed to provide protocol conversion as part of basic data network services, an issue that could have far-reaching consequences for users and vendors.

It is not yet clear what the FCC's ruling will entail, but it is unlikely the agency can please all camps. The BOCs say they could offer protocol conversion more efficiently and at lower cost if it is categorized as a basic service.

But some users groups and members of the public packet network industry oppose classifying protocol conversion as a basic, regulated service rather than as an enhanced service.

Opponents fear the BOCs could use their monopoly over the public network to gain an unfair advantage over competitors. Some observers believe the FCC's action could set the tone for its decisions on other enhanced services.

The BOCs currently can provide some types of protocol conversion if they obtain a waiver from the FCC. As a result of a March 1985 FCC ruling, BOCs with waivers can build X.25-based synchronous packet networks and provide the protocol conversion necessary to support asynchronous end-user devices. The BOCs are also allowed to convert X.25 to X.75 for data transmission between packet networks. Nearly all the BOCs have received waivers to offer asynchronous-to-X.25 service, but the companies complain the waiver process is costly and time-consuming.

To qualify for the waiver, BOCs must provide the FCC with an accounting plan showing that protocol conversion will not be cross-subsidized with revenue from basic telephone company services.

In addition, the BOCs must show that they will not use their bottleneck services to provide them-

See **Protocol** page 46

► HANNOVER FAIR

Novell unveils bridge, gateway tools**BY MARY PETROSKY**
West Coast Correspondent

HANNOVER, West Germany — Citing strong European demand, Novell, Inc. introduced bridge and gateway products designed to link local nets through X.25 packet-switched networks at last week's CeBIT '87 computer fair here.

In the U.S., Novell released financial results for the first quarter of its fiscal year. Revenue increased a whopping 106% over the similar period last year, growing from \$14.4 million to \$29.8 million. Profit jumped 71%, from \$2.07 mil-

lion to \$3.5 million.

Novell said the wide-area networking tools — the NetWare Remote Bridge X.25 and NetWare X.25 Gateway — are the first in a series of X.25 products to come from a joint development effort with Montreal-based EICON Technology Corp. EICON designs and manufactures micro-to-mainframe communications products.

Novell's announcement comes on the heels of Gateway Communications, Inc.'s introduction of its G/Remote Bridge, which links remote local nets through X.25 networks running Novell's NetWare

networking operating system ("Gateway bridge links Novell nets," NW, Feb. 23).

NetWare Remote Bridge X.25 provides connections among as many as 32 remote local networks running Novell's NetWare. The NetWare X.25 Gateway allows users on a NetWare-based local net to share data with asynchronous hosts from companies such as Digital Equipment Corp., Hewlett-Packard Co. and Tandem Computers, Inc.

Support for IBM hosts, including the System/36 and System/38, will likely be available by year end, company officials said.

"We've had a huge demand for X.25 in Europe and Canada, and EICON is well-known in Europe," said Mark Calkins, Novell's director of corporate marketing and development. EICON's products are certified to work on or comply with the packet-switching requirements of at least a dozen X.25 networks worldwide, he said.

Testing for certification or compliance can take up to six months in the U.S. and from six to 12 months in Europe, Calkins said. The ability to provide off-the-shelf X.25 capability was a major factor in choosing EICON, Calkins said.

X.25 gateway products for local networks have only been available for the last six months or so, said Bob Clark, vice-president of the consulting division of The Seybold Group in San Jose, Calif.

Banyan Systems, Inc. was one of the first local networking vendors to offer wide-area networking via X.25 and has taken sales from Novell on that account, Clark said.

Providing the capability to connect remote local nets to each other is "where Banyan does very well

See **Novell** page 46

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Avatar will unveil the Alliance ZSL, an adapterless RS-232 LAN. **Page 6.**

J.C. Penney invests \$40 million in a home shopping service that combines cable TV and touch-tone telephones. **Page 43.**

INDUSTRY UPDATE

New England Telephone bets big on digital Centrex. **Page 7.**

TELECOM TRENDS

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DATA DELIVERY

Vendors are divided over the X.32 standard, but it is gaining

ground in the U.S. **Page 13.**

COMMUNICATIONS MANAGER

Management experts say CIOs are springing up in many corporations, but split on whether communications or MIS managers are better prepared to tackle the job. **Page 15.**

LOCAL NETWORKING

As Novell grows, so do its problems. President and CEO Ray Noorda talks frankly about both. **Page 19.**

NEW PRODUCTS AND SERVICES

Telephones become terminals with Octel's AspenLink voice mail adjunct. **Page 21.**

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► NETWORK COMPUTING FORUM

Vendors, users unite to push shared computing

Will research distributed applications.

BY PAULA MUSICH
Senior Editor

BOSTON — A newly formed standards group, the Network Computing Forum (NCF), last week kicked off a drive to advance standards that would enable networks of multivendor devices to share program processing loads.

Organized by Apollo Computer, Inc., NCF has 31 charter members from both the user and vendor communities. Large user members include Boeing Computer Services, Caterpillar, Inc., General Electric Co., Rockwell International Corp., Westinghouse Electric Corp., the University of Iowa and the University of Michigan. Among the major vendors participating are Apple Computer, Inc., 3Com Corp., Motorola, Inc., Texas Instruments, Inc. and Racal-Redac, Inc., a large British electronics firm.

"The forum's agenda will be to discuss, review and adopt network protocols, services and architectures that support vendor-independent integrated network computing environments," according to literature issued by the group.

"The group is structured to create a standard by achieving a critical mass of usage," said charter member Craig Mundie, vice-president of product development at Alliant Computer Systems Corp. in Littleton, Mass.

The concept is to provide developers with a framework for building applications that can run simultaneously on different machines linked over standard net-

works such as Ethernet. This would enable technical workstation users on a network to automatically perform computing functions on the most appropriate CPU for the task, whether it be a supercomputer, simulator or other workstation.

The NCF grew out of informal discussions among Apollo representatives, developers of technical applications and Apollo customers during the development of Apollo's Network Computing System (NCS) ("Apollo's NCS distributes computer applications," NW, Feb. 16). NCS is a set of programming tools that allows developers to create distributed applications providing compute sharing in networks linking heterogeneous machines.

NCF hopes to complement the work of other organizations, such as the Corporation for Open Systems (COS) and the MAP/TOP Users Group, according to organizer, John Robotham.

"Our emphasis is on a new style of computing," he said. "Our purpose is not to define new standards, except where the pieces don't exist." Current networking standards don't address the concept of sharing computing resources on a network, Robotham maintained.

The NCF hopes to become an associate member of COS and is working to develop a relationship with the MAP/TOP group.

"This new style of computing will run on top of accepted network standards like Ethernet, MAP/TOP, and emerging data

sharing standards such as AT&T's Remote File System, Sun Microsystems, Inc.'s Network File System, the International Standards Organization's File Transfer Access Method and Apollo's Domain," said David Nelson, vice-president and chief technical officer at Apollo.

Many applications have procedures that consume the bulk of the user's workstation power, said Nelson. Network computing will allow these compute-intensive procedures to run on larger machines such as mainframes or supercomputers across a network, while the rest of the application will run on the user's desktop computer. "A workstation user in real time could graphically interpret and manipulate the process running on a supercomputer," he said.

Another goal of network computing is to provide workstation users with access to mainframe applications that are not easily ported to workstations. Network computing will allow the bulk of an application to remain on a large system while the end-user graphics interface can be ported and run on the workstation, Nelson said.

In recruiting new members, the NCF's priority is to attract applications developers. They, in turn, will attract large end users whose interest may stimulate participation by the computer vendors that sell to them.

The NCF is also extending invitations to key vendors such as IBM, Digital Equipment Corp., Hewlett-Packard Co., Cray Research, Inc. and Sun Microsystems. A DEC spokeswoman didn't know whether the company had been contacted by NCF and didn't know how the minicomputer maker would respond. IBM was not available for comment by press time.

Apollo will submit its NCS scheme to the NCF for consideration, said Robotham. "It will stand on its own merits." □

► CONTRACTS

Rolm wins college bid

BY JIM BROWN
New Products Editor

NEW YORK — After two years of planning, Columbia University last week awarded a \$13 million contract to an IBM/Rolm Corp. enterprise marketing team for a digital network that will replace the university's current Centrex services.

Under terms of the contract, the Rolm/IBM team will recable university buildings and install a 10-node CBX II Model 9000AE switch system, as well as act as the general contractor for other facets of the private network project. Columbia, an old-line IBM customer, is believed to be the first account for the 9000AE, the high-end switch Rolm introduced last month.

"We're a flagship installation See **Columbia** page 46

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Box 9171, 375 Cochituate Road
Framingham, Mass. 01701-9171
617/879-0700

Editor
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Managing Editor
John Gallant
Features Editor
Steve Moore
Assistant Managing Editor — News
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Assistant Managing Editor — Production
Lisa Guisbond
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Staff Writers
Michael Fahey
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New Products Editor
Jim Brown
Washington, D.C. Correspondent
Karyl Scott
1273 National Press Building
529 14th Street NW
Washington, D.C. 20045
West Coast Correspondent
Mary Petrosky
3350 West Bayshore Road
Suite 201
Palo Alto, CA 94303
Assistant Features Editors
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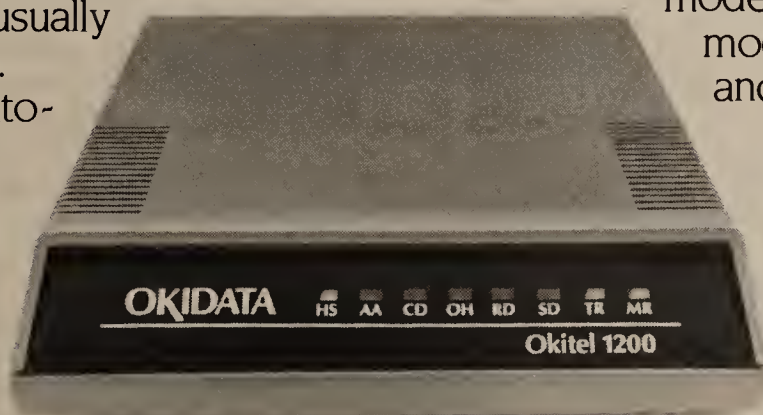
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► TROUBLED TROUBLESHOOTERS

BOCs fix network repair*New programs solve service delays.***BY BOB WALLACE**

Senior Editor

Criticized for their inefficient response to maintenance calls, several Bell operating companies have instituted programs designed to speed the detection and resolution of customer network problems.

Wisconsin Bell, Southwestern Bell Telephone Co. and Illinois Bell are among the BOCs that have moved to reduce the amount of time it takes to resolve network problems called in by customers.

Although there are fewer tales of service nightmares to be heard today than when the Bell System first broke up, BOC problem resolution continues to be a key customer gripe.

Many of the BOCs are trying to address the problem by building on or revamping their "611" service. The 611 services provided by many BOCs give customers a single number to call to request repair service.

In June 1986, Wisconsin Bell launched its Major Business Account Program. This program is designed to serve the BOC's 400 larg-

est users. Over 100 large users pay no extra fee for the service and are currently a part of the program, to which eight to 10 more customers are added each month.

Bill Schutts, a sales manager with Wisconsin Bell, claimed the Major Business Account Program was founded as a means of introducing order to the service handling process.

"Some of our customers had as many as 20 telephone numbers of BOC people they would call for service and repairs," Schutts explained. "They were calling central office technicians, facilities test staffers and general foremen with service or repair calls. Now users are given one number to call for service, a second number for repairs and a third number for network design assistance," Schutts explained.

Jack Kamoske, a data communications consultant with Rexnord, Inc., a Milwaukee-based manufacturing firm, said he is pleased with Wisconsin Bell's Major Business Account Program. "We re-

ceive excellent services from Wisconsin Bell. Their technicians call us after the problem has been rectified to inform us the nature of the problem," he said.

Beth Gundy, telecommunications supervisor for Johnson Controls, Inc. in Milwaukee, was equally complimentary about the Wisconsin Bell account program. Gundy said BOC staffers respond much faster to her needs than they did under the 611 service. "This service has been very beneficial to us."

Gundy said the BOC program technicians have assisted the company with cutting over a Centrex service. "On one occasion, their people helped us cut over a 43-line Centrex facility overnight," she noted.

Pat Chandler, data and voice network manager for Cameron Iron Works, Inc., in Houston, is a member of Southwestern Bell's Single Point of Presence (SPOP) program, which enables users throughout Texas to call a single number if they are unhappy with the service they have received from lower level BOC technicians.

"If you are hung up at a certain level in the BOC service call handling structure, you can call this number and speak to a member of the SPOP group who does not have to go through chan-

nels to get the problem fixed," Chandler explained.

Illinois Bell has taken a different approach.

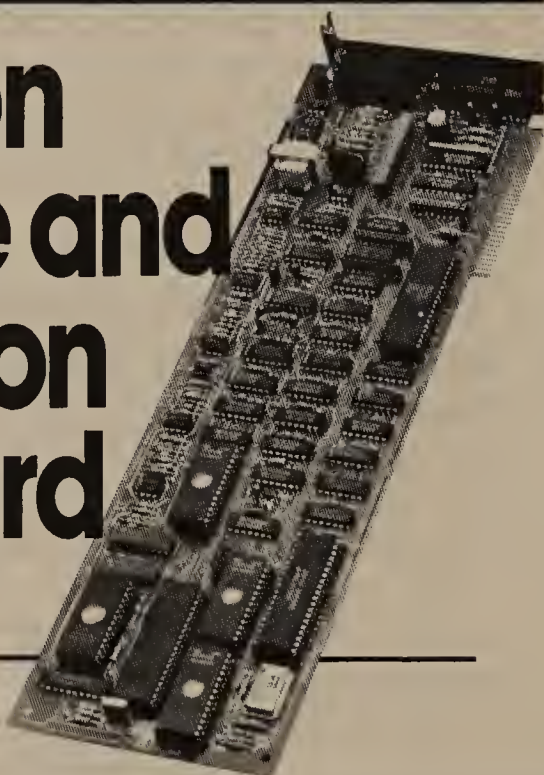
Earle Curtis, assistant manager of service distribution for Illinois Bell's Centralized Repair Services Answering Bureau (CRSAB), said his company is nearing completion of an eight-year program to decentralize its 611 service to improve the company's ability to respond to customer problems.

Starting in June, service requests will be handled by one of 17 individual CRSABs. The BOC formerly handled service calls for users located in Chicago and surrounding suburbs through a single facility.

Although many applaud the new BOC service programs, some users are concerned that small and medium-sized customers will not realize the benefits of the BOC efforts, which are targeted at the carriers' biggest customers.

The director of a Chicago-based users group, who requested anonymity, said Illinois Bell's service program has caused problems for companies with fewer than 600 telephone stations.

"Our group has been asking for better service for years," he said. "Users dial 611 to report problems to Illinois Bell but are rarely notified of the cause of the problem or when the problem has been resolved." □

More news: page 43**3270****MICRO-MAINFRAME
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Avatar to unwrap PC net**BY PAULA MUSICH**

Senior Editor

SAN FRANCISCO — Avatar Technologies, Inc. will introduce an adapterless RS-232 personal computer local network this week that links up to 20 microcomputers at about \$100 per connection, *Network World* has learned.

Avatar's low-speed Alliance Zero Slot LAN (ZSL) enables IBM Personal Computers and compatibles to share files, printers, modems and protocol converters. It also provides simple electronic messaging and a bulletin board feature.

The hub of the Alliance ZSL is based on a Hitachi, Ltd. CMOS microprocessor running at 6 MHz. Nodes are wired to the hub in a star configuration using nonshielded twisted-pair wire that supports speeds up to 115K bit/sec. Station wires have an RJ45 telephone-type connector on one end and a 25-pin RS-232 connector on the other. Nodes can be located up to 500 ft from the hub and 1,000 ft from each other.

Networking software is provided on one diskette and is not copy-protected. It provides network management functions, including the ability to add or change connections, specify device types, establish communications characteristics and set password security levels.

Personal computer users can share each other's files through 130K bytes of software that is loaded into random-access memory on the individual personal computers from the Alliance hub. Although it doesn't support file locking, a user attempting to access an open file is alerted that the file is already open. File transfers are completed as background tasks, while the user goes on to perform other tasks in the foreground using a hot-key function. "A three- to four-page word processing document takes between two and five seconds to transfer," a company spokesman said.

Alliance ZSL supports Kermit file transfer protocols that, when used with a third-party gateway product, support asynchronous links to minicomputers or mainframes supporting the public domain protocol. IBM mainframes can be accessed using a 3270 emulation device.

Remote personal computers can access the network by dialing in to an attached modem, and network users can view the directories of remotely attached personal computers and transfer data in the same manner.

An eight-node version of the network is priced at \$1,195, a 14-node version is \$1,595, and a 20-node version is \$1,995. A six-node upgrade costs \$600. The network will be available later this month. □

INDUSTRY UPDATE

HP gives speech to data bases

Hewlett-Packard Co. is ushering in the next generation of office automation products. The company recently obtained a license for use of text-to-speech technology developed by Speech Plus, Inc. of Mountain View, Calif. With this capability, computers can simulate voice to deliver audio information contained in a data base.

► TRANSPACIFIC TRAFFIC

PACTEL mulls joint fiber link project

BY PAM POWERS
Senior Editor

SAN FRANCISCO — Pacific Telesis Group said last week it is "very interested" in joining a consortium that will bid to build a transpacific fiber-optic link between the U.S. and Japan.

Separately, Pacific Telesis Chairman and Chief Executive Officer Donald Guinn said the regional Bell holding company will enjoy continued profit growth in fiscal 1987 and will pursue a strategy of acquisition to strengthen its position in key nonregulated businesses.

Pacific Telesis officials said the company participated in a study, completed in January, to determine the feasibility of working with several Japanese and other foreign firms to build and operate what would be the second transpacific link between the U.S. and Japan. Other firms
See **PACTEL** page 8

► DIGITAL SERVICES

N.E. Tel pondering Centrex salvation

BOC also eyes packet net enhanced services.

BY PAM POWERS
Senior Editor

BOSTON — New England Telephone is betting on large profits and 20% annual growth in the digital Centrex business, while fighting tooth and nail to win back large users that in recent years have migrated to private branch exchanges.

In an interview last week with *Network World*, Steve Brinkert, product manager for Centrex services, said New England

Telephone is heavily committed to the sale and expansion of digital Centrex services.

One of Nynex Corp.'s two operating companies, New England Telephone is aggressively targeting big business users in its five-state territory with Intellipath, a 500-line-and-above digital Centrex offering. Intellipath and Nova Centrex, the company's under-100-line digital Centrex offering, were unveiled in late 1985.

Like its fellow BOCs, New England Tele-
See **Nynex** page 44

► DEFENSE DATA NETWORK

Feds shop for switches

DOD seeks second vendor of packet gear.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The Defense Communications Agency (DCA) is looking for a secondary supplier of packet switches to augment BBN Communications Corp. equipment currently used in the Defense Data Network (DDN).

The DCA is the Department of Defense organization responsible for the DDN and other communications programs within the military community. The DCA's quest for an alternative switch supplier is part of a larger Department of Defense program to introduce more competition in the procurement process.

Both DCA and BBN officials say this is not an attempt to replace BBN as the prime contractor on the DDN project, although outside observers say this inquiry could eventually lead to that.

A request for information appeared recently in the *Commerce Business Daily* asking vendors to send DCA information about products compatible with BBN switches and related software. The installed equipment comprises a combination of public domain software and proprietary hardware and software supplied by BBN.

BBN has been the prime contractor on the DDN network and the Defense Department's older Advanced Research Projects Agency Network (ARPANET) since their

inception. One BBN official termed the DCA initiative to introduce competition in the procurement process as "a sensitive subject around here."

Phillip DiMauro, DDN program director, said the request represents a Defense Department-wide effort to take advantage of increasing industry competition. "This doesn't mean we aren't pleased with the work that BBN has done, or that we are looking to get rid of BBN or their technology," DiMauro said. "We're just trying to get the very best switches we can, and we want to see if there's other equipment out there that is compatible with our equipment."

The DCA *Commerce Business Daily* product "synopsis" said that vendors had to respond with information on existing technology, either off-the-shelf switches or equipment that can be modified in a short time to be compatible with the present network. Current network equipment includes BBN C30-E and C3 PSN switches running release 7.0 BBN software, according to a BBN spokesman.

While the notice said the synopsis was for planning purposes only, it did note that DCA would be looking to purchase between 25 and 200 switches annually. DiMauro said the agency will likely purchase about 100 switches next year.

"DCA is trying to get the best
See **DDN** page 10

INDUSTRY EYE PAM POWERS

MCI has yet to back its packet prediction

A deafening silence. MCI Communications Corp. has said for a month or more that it will soon announce a private packet network offering in conjunction with another vendor to replace MCI's recently axed Datatransport service.

Bob Yundt, director of marketing for data services, said in early February that a press conference

would be held at the recent Communication Networks '87 show. But the briefing was canceled, and there's been no word yet from MCI about its plans in the private packet area.

There are a number of possible explanations for this unexplained delay. It may be a tactic to pique the interest of users and the press. MCI could have empty hands behind its back, despite hints to the contrary.

Another possibility is that a problem may have developed in relations between MCI and its packet partner. Whatever the

case, users can only wait and wonder.

Like the Phoenix from the ashes? Western Union Corp. wheezed consumptively through 1986, almost suffocating under the weight of its own debt. As far as one can tell, Chapter-11 is still licking at its heels.

Considering its disarray, users will no doubt be leery of dealing with Western Union.

But now two enterprising venture capital companies are vying for control of the old beast.

At the same time, in the middle of all its problems, Western Union has erected a packet-switching service.

The company's strategy, of course, is to migrate away from its old, floundering lines of business toward more lucrative markets.

The idea is commendable, but considering the company's current state of disarray, users will no doubt be leery of dealing with Western Union. The
See **MCI** page 10

► WORLD TELECOM

Top guns bid in CGCT takeover

BY KARYL SCOTT

Washington, D.C. Correspondent

PARIS — The world's most powerful telecommunications companies last week bid to win control of France's state-owned telephone equipment manufacturer, Cie. Generale des Constructions Telephoniques (CGCT), in what has become one of the most hotly contested takeover struggles in telecommunications history.

Among the firms that bid for ownership of CGCT were AT&T, in partnership with Philips Telecommunications N.V. of the Netherlands, Siemens AG of West Germany, LM Ericsson of Sweden, Northern Telecom Ltd. of Canada and Italtel S.p.A. of Italy.

French President Jacques Chirac has until April 30 to choose from among the bidders. Some of the firms, including AT&T and Siemens, had submitted proposals for control of CGCT earlier.

This time, each of the bidders teamed with one or more French firms to conform to a government requirement that a French company hold a majority interest in CGCT. AT&T/Philips joined with Societe Anonyme de Telecommunications (SAT) and is expected to announce additional French partners. Information on Siemens' French partner was unavailable last week.

Ericsson will team with three French partners: The Matra, a high-tech firm specializing in aerospace and defense industries; Bouygues Group, a worldwide construction company; and the Bank Indosuez. Italtel asked for a two-month extension in order to prepare a more complete proposal.

Northern Telecom did not name any French partners in its bid but said it would comply with the French partner requirement. Northern Telecom officials said they have held discussions with a group of French telecommunications firms but could not reveal their names. Northern Telecom's potential partners are awaiting French Postal Telegraph and Telephone certification of Northern Telecom's central office switch. The French companies want to be sure the Northern Telecom switch is compatible with the French telecommunications network before they join with the company.

Competition among international rivals for control of CGCT has escalated into a trade imbroglio of substantial proportions in recent months. After AT&T/Philips proposed to buy CGCT, West German officials pressured the French government to accept a rival proposal from Siemens. Officials of other European nations also exerted influence on France. □

PACTEL from page 7

involved in the study included British-based Cable and Wireless p.l.c., Merrill Lynch & Co., C. Itoh & Co., Ltd., Toyota Motor Corp. and several Japanese banks. A second consortium of Japanese companies, led by Matsushita Electrical Industrial Co. Ltd. and Mitsubishi Corp., has already bid for the project, which will be awarded by the Japanese Ministry of Post and Telecommunications.

Susan Rosenberg, a spokesperson for Pacific Telesis, said the RBHC has not reached a final decision on whether it will participate in the consortium but said it is very interested in the project.

If Pacific Telesis decides to join the consortium, it would be the

second RBHC to enter the international long-distance field. Nynex Corp. is already a member of a group seeking to build a transatlantic link.

Because the RBHCs are barred from long distance by the strictures of the Modified Final Judgment, Pacific Telesis would need approval from U.S. District Court Judge Harold Greene to invest in the consortium. Nynex has already sought a waiver from Greene.

At a New York meeting staged for securities analysts, Guinn last week reaffirmed his company's commitment to expansion through acquisition and said earnings would continue to increase in 1987. Pacific Telesis posted an 11% rise in earnings in fiscal year 1986

compared with 1985. Guinn did not elaborate on the size of the projected earnings increase, but said that the RBHC intends to maintain capital spending at current levels through 1990.

Rather than entering new fields, Pacific Telesis will acquire companies that strengthen its position in nonregulated businesses where the RBHC already has a presence, Guinn said. Pacific Telesis now competes in cellular telephone and network management services markets.

As a group, the nonregulated subsidiaries were unprofitable last year, and Guinn said he doesn't anticipate profitability for the nonregulated businesses as a whole for several years yet. □

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So, they've joined the company committed to building fiber optics and the clearest connections ever. Connections so clear over 75% of all the business people we tested preferred the calls over US Sprint fiber optic lines.

And they preferred them over calls made on AT&T lines.

There's other impressive news, too. As stated in BUSINESS WEEK^{***} on December 1, 1986, companies like "Sears, Roebuck & Co.," "Honeywell," "Unisys Corp. (Sperry-Burroughs)," and "F.W. Woolworth" and "Singer" are now US Sprint customers.

Over 75% of all the business people we tested preferred the clarity of calls over US Sprint fiber optic lines.



These are companies that don't make decisions on a whim. They demand the excellent quality at the lowest price. And they chose us.

► EARNINGS OUTLOOK

US West sees lean '87

BY PAM POWERS
Senior Editor

ENGLEWOOD, Colo. — US West, Inc. forecasted declining earnings growth for 1987 at a securities analysts meeting here last week, and vowed to stick to its core territory in future nonregulated business ventures.

Executive Vice-President and Chief Financial Officer Howard P. Doerr said, "We are not satisfied with our 1986 financial performance, and we expect to see mod-

est earnings growth in 1987." Doerr said that in contrast to earlier expectations of 8% earnings growth per year, US West expects 4% to 6% growth in 1987. That growth will be contributed primarily by nonregulated operations. Doerr predicts US West's three telephone operating companies will report flat earnings growth. On Jan. 1, the Federal Communications Commission reduced the regulatory rate of return for the operating companies to 12%. If the company earns consistently at the

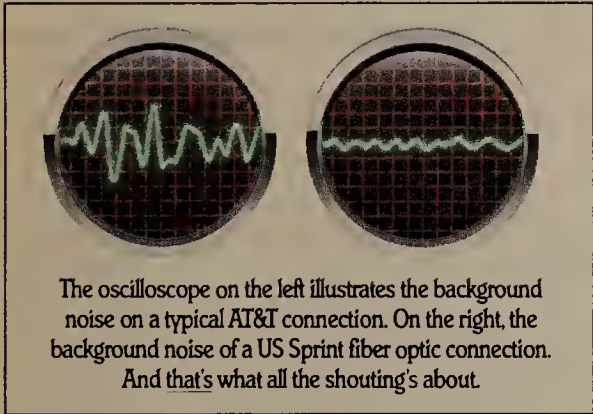
new rate, Doerr said the reduction will result in US West's losing \$43 million in net income over the course of the year. Additionally, the 14-state territory that US West serves has undergone recent economic decline, according to a company spokesman. "In the past year, our territory has experienced slowdowns in its primary areas of business, namely agriculture, oil and gas," the spokesman said. "We believe this is only temporary, but it will have a negative impact on US West this year." The regional Bell holding company has its hopes pinned on nonregulated lines of business to ameliorate the effect of depressed

earnings on the regulated side. "Whatever growth we see will come from our diversified operations," the spokesman said. US West's year was clouded when it ended its bid to sell customer premises equipment nationwide in favor of concentrating on sales within its own 14-state territory. Doerr alluded to US West's attempts to expand into new markets, saying "we don't apologize for taking risks," but he emphasized the company's commitment to its core region. "The restructuring of US West Information Systems will allow it to focus on the area where we have the strongest competitive advantage, our 14-state home region," he said. □

In fact, US Sprint now provides long distance services to 475 of the FORTUNE 500. And that's up from 416 in May. As you're reading this, US Sprint is changing the way your long distance will sound and the way your data will travel across the country. We're building the only, coast-to-coast, border-to-border, 100% fiber optic long distance network.



475 of the elite Fortune 500 companies use US Sprint.



The oscilloscope on the left illustrates the background noise on a typical AT&T connection. On the right, the background noise of a US Sprint fiber optic connection. And that's what all the shouting's about.

All new. All fiber optic. We already have more fiber optic cable than AT&T. And AT&T has to mix fiber optics with older technologies that they've used for so long, like copper cable and microwave. US Sprint fiber optics is so clear and noise free, that half of all the people we tested on a US Sprint fiber optic long distance connection actually thought it sounded closer than a local call.

But it wasn't. And, of the 77% of the business people who preferred the fiber optic calls over US Sprint lines, 9 out of 10 said they'd switch.

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BRIEFS

Convergent Technologies, Inc. and **Baron Data Systems**, located in San Leandro, Calif., reached an agreement in principle for Convergent to acquire Baron Data in a cash merger transaction for \$15 per share.

Baron Data is a systems integrator specializing in medical and legal computers.

For the nine months that ended Dec. 31, 1986, Baron had sales of \$35.1 million.

\$

Western Union Corp. reported a net loss for 1986 of \$531 million and a net loss of \$460 million for the fourth quarter, compared with a net loss of \$336 million in the fourth quarter and \$367 million for the year in 1985.

\$

AT&T and **Microsoft Corp.** announced they will introduce a specific version of the Unix System V operating system for Intel Corp.'s 80386 microprocessor. The product, expected to be available in early 1988, will incorporate Microsoft's Xenix System V compatibility into AT&T's Unix System V Release 3 for computers using the Intel 80386 microprocessor.

\$

DSC Communications Corp. reported 1986 fourth-quarter earnings of \$5.4 million, compared with a net loss of \$45.2 million for the similar 1985 period. Year-end results generated net earnings of \$17 million.

\$

The Orion Group, Inc. and **Xicom Technologies Corp.** signed a joint marketing agreement in which Orion and Xicom will integrate the Orion sna62 Peer Communications Facility and the forthcoming Orion sna0123 Facility with Xicom 3270 and 3770 Micro-Node products.

The agreement also calls for both parties to recommend and support each other's products.

\$

Paradyne Corp. reported a fourth-quarter loss of \$26,265,000, compared with \$15,823,000 for the similar 1985 period. For the year that ended Dec. 31, 1986, a net loss of \$38,461,000 was reported, compared with a net loss of \$31,182,000 in 1985. □

DDN from page 7

prices they can. By introducing competition in the buying process, they think they will have more control over prices," said Eric Elsam, director of the DDN program at BBN. "This request for information shouldn't be interpreted as a move to substantially increase the network beyond what is already planned. DDN is constantly growing, with about eight new packet switches and related access circuits coming on-line every month."

While much of the DDN software is in the public domain, the BBN switches and some of the software that drives the switches are proprietary to BBN. It may be difficult to find a vendor that can modify its equipment to interoper-

ate with BBN gear, observers said. "We don't know if we'll find a vendor that can supply compatible equipment," DiMauro said. "That's why we issued the synopsis. If we don't, that will be the end of it."

DDN currently supports about 12,000 users and connects 650 host sites. New host locations are brought onto the network at a rate of about 50 per month. DDN is a network of networks, not a single homogeneous network. It consists of several subnetworks with vary-

ing levels of security.

ARPANET was the first packet-switched communications system developed for the Defense Department by BBN in 1969. It serves the Department of Defense research and development community and is designed for the transmission of unclassified information.

Military Network (MILNET), also unclassified, is a domestic network serving the communications needs of the various branches of the armed forces. MILNET was

broken off from ARPANET in 1984. Movements Information Network (MINET) is the European equivalent of MILNET.

The WMCCS Intercomputer Network Communication Subsystem (WINCS) is the worldwide Command Control Communications Intelligence (C3I) network for the Joint Chiefs of Staff, designed for the exchange of highly classified information.

Defense Integrated Secure Network (DISNET) was established in 1985 for various users within the Department of Defense to exchange classified information. Secure Compartmented Information Network (SCINET) is another Defense Department network designed for highly classified information. "The information that travels over these two networks is so highly classified that I can't tell you anything else about it," DiMauro said.

Each subnetwork uses separate communications facilities and monitoring centers, but the networks share transmission and switching facilities. As computer security technology becomes more sophisticated, the DCA hopes to integrate the various subnets more closely and to share communications facilities. □

MCI from page 7

venerable firm may encounter some difficulties persuading prospective customers that it has succeeded in taming its troubles.

Movement at the top... Last week, AT&T's top sales executive, Richard Holbrook, bid adieu to that company.

It's no secret that AT&T is suffering low morale in its thinning ranks. But the departure of those from the upper echelons can be a sign of more deep-seated trouble. It may be that Holbrook, a 30-year veteran, was not impressed by the moves AT&T is taking to get back on track. His exit could also be a sign that AT&T is looking for new blood to fuel its newly refocused sales efforts.

In either case, there are questions about the effectiveness of the reorganized sales division, which has performed poorly thus far.

One company's loss... Netrix Corp. of Herndon, Va., scored a coup when it wooed Chuck Stein away from BBN Communications Corp., a private packet net vendor.

Stein, now Netrix's president and chief executive officer, was the putative navigator of BBN's rose-strewn path to leadership in the packet-switching market.

Netrix is composed primarily of ex-Telenet Communications Corp. folk, who seem to be moving swiftly and with great purpose into the market with an impressive packet/circuit switch product.

Already, the company has teamed up with MCI in a joint bid to build a private packet net for The E.F. Hutton Group, Inc. Users should keep an eye on Netrix. It is likely to make some industry waves in the coming months. □

DDN is a network of networks, not a single homogeneous network.

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Both our alternative routing approach and our Network Operations Center are unique strengths of BBN Communications. Together they represent a commitment to reliability that convinced major corporations like MasterCard and Wang to choose BBN as their private wide-area network company.

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Users purchasing AT&T's System 85 PBX may soon find an AT&T System 85 Users Group membership application and ancillary information on the group packaged with the switch. AT&T and the users group are working to achieve such an end.

► DETECTIVE WORK

Users wary of shaky vendors

Begin requiring financials for RFPs.

BY BOB WALLACE
Senior Editor

A spate of company mergers and acquisitions is encouraging users to take a harder look at the financial solvency and future of prospective communications service and equipment suppliers.

Several large users told *Network World* that securing financial data on vendors and information concerning plans for their product lines has become a prerequisite to the request for proposal process.

This vendor investigation work

often results in longer sales cycles for vendors, who are now being asked, or told, to provide corporate information and data on the firm's plans for products and services.

Customers are also pressing vendors for dedicated technical support personnel and a direct communication channel to vendor management to assure responsiveness to their networking needs.

A proposed merger recently spelled confusion for Bergen Brunswick Corp., a Calabassas, Calif.-based pharmaceutical wholesaler. The company was exploring

the possibilities of incorporating satellite communications technology into its network and ended up entertaining presentations from two vendors slated to be united under a single corporate mantle.

Dyanna Winn, a telecommunications and office systems director for Bergen Brunswick, discussed satellite systems with Contel Corp. subsidiary American Satellite Co. and Communications Satellite Corp. (COMSAT). COMSAT and Contel have already received shareholder approval to merge, and are presently awaiting FCC approval.

"Representatives from American Satellite and COMSAT said that as far as they were concerned, there are two different sales forces on the road, and we should deal with them as if they were two different companies," Winn said. She said too many questions concerning the future of the separate companies were left unanswered.

"We will not make any decisions until we get a clearer picture of

See RFP page 12

► DIRECT DIAL

Allnet cuts long-haul rates 10%

BY BOB WALLACE
Senior Editor

BIRMINGHAM, Mich. — Determined to maintain the long-distance service pricing gap between itself and chief competitor AT&T, Allnet Communications, Inc. slashed interstate direct-dial service rates by an average of 10%.

The new pricing for Allnet's services took effect March 1. Actual rate changes are based on the distance of the call and what time of day the call is placed, the carrier said.

Pricing for Allnet's MAXCESS I, II and III WATS-like offerings

See Allnet page 12

Large users rate PBX equipment and service organization		
Equipment	AT&T	Rolm Corp.
System reliability	3.7	3.5
Vendor service and support	3.2	2.75
Features	2.75	3.0
Cost	2.6	2.75
Ease of management	3.1	2.5
Service organization		
Overall accessibility	3.4	2.75
Emergency response	3.25	2.75
Training and support	2.5	2.6
Employee performance	2.8	2.5
Ratings based on a 16-user survey.		
SOURCE: THE YANKEE GROUP, BOSTON		

► CALL CREDITS

AT&T launches key system incentives

PARSIPPANY, N.J. — Working to push past its beachhead in the low-end private branch exchange marketplace, AT&T introduced an incentive program that provides users of its key telephone systems with credits toward the purchase of larger systems.

The incentive, dubbed The America's Choice Bonus Program, enables users renting AT&T's 1AKey and Com-Key systems to amass credits toward the purchase of any of five Merlin Communications Systems and its System 25 PBX.

AT&T customers will be automatically enrolled in the program and will receive information packages this month that include \$50 worth of introductory credits.

Each month, customers' bonus accounts will be credited with 10% of their equipment rental payments or fixed-term lease bills. ▣

CROSS TALK BOB WALLACE

Delayed tariffs reap profits

Not long after AT&T announced its massive long-distance rate reductions, US Sprint Communications Co. and MCI Communications Corp. followed suit, promising their own price cuts. But neither of the long-haul carriers implemented their rate reductions until two months later.

Bob Ellis, president of the Rockville, Md.-based Aries Group, Inc., a tariff analysis firm, contends that MCI will pull in \$14 million, and US Sprint \$8.6 million, in revenue that they would not have received if they had reduced their rates to mirror AT&T's Jan. 1 cuts. The companies amassed these revenues by slating their new service prices to take effect a full two months after AT&T's were instituted.

For their part, the long-distance carriers say they need time to analyze AT&T's pricing plans and improve billing systems before announcing their own rate reductions.

But long-distance carriers trying to maintain prices below AT&T's can benefit from implementation delays with little fear of customer revolt and may, in fact, purposely build delays into their rate plans.

US Sprint and MCI customers are unlikely to jump ship in the time between the carriers' announcements to match AT&T's rate cuts and when the reductions actually take effect, Ellis theorized.

"They receive the publicity when

they claim they will institute lower rates, and for two months they can keep users paying current service rates which are more expensive than AT&T's," he explained. "[US Sprint and MCI] have been playing this game for quite a while."

US Sprint, MCI and others are suffering the whipsaw effect of having to spend huge amounts of capital to expand their networks in competition with AT&T and each other, while being forced to cut rates — which reduces revenue — to maintain prices below AT&T's.

The pressure is taking its toll. In December, MCI revealed plans to lay off 2,400 workers and take a \$500 million charge against earnings in the fourth quarter of this year. US Sprint reported a \$356 million loss for the last half of 1986.

AT&T proposed sweeping long-distance service cuts last November. The Federal Communications Commission adjusted this rate restructuring and the new pricing took effect Jan. 1.

Users complain that waiting for US Sprint and MCI rate cuts to take effect has complicated their efforts to optimize their telecommunications networks for savings.

Users groups might consider pressing other common carriers to implement cuts more speedily than they have in the past to help streamline the net planning process. ▣

RFP from page 11

what this restructured company is going to look like," she said, adding that financial information on the COMSAT parent and Contel's American Satellite subsidiary would be a precursor to further exploration of a satellite network contract.

Determining commitment

Gary Henkel, communications services manager for Harris Semiconductor sector in Melbourne, Fla., said users should also try to determine the company's commitment to a particular product or service. "Customers have to spend more time checking the overall financial backing for the product," he said.

"Users should ask, 'What's the vendor's budget for the product? What are the plans for the product five years down the line?' and 'How many people are working on the product or service project?'"

Henkel suggested one way of acquiring this information, which vendors often say is proprietary, is to write the requirement into the RFP.

Henkel also bemoaned the need for at least one dedicated account representative for each product and service. Harris Semiconductor had purchased a broadband local-area network from 3M Corp.'s Integrated Systems Division. When Allen-Bradley Co. purchased the Integrated Systems Division, Henkel feared support services would

slacken.

"Unlike many account people who are nontechnical, our dedicated account liaison from Allen-Bradley understood our networking problems and also had the necessary clout to command resources for us when we ran into problems," Henkel said.

Although Harris Semiconductor survived the 3M Integrated Systems-to-Allen-Bradley transition, the company was less fortunate in its dealings with now-defunct RCA Cylix Communications, Inc., a division of RCA Corp.

"[The RCA Cylix people] came in and promised us they could do better than AT&T's Dataphone Digital Service," Henkel recalled. "It was just what we wanted to hear."

Henkel urged users to carefully investigate the financial background of a prospective vendor — big or small — and suppress urges to hastily implement products and services.

"Sometimes, we want something so badly that our thought process becomes muddled and our logic and intuition go out the door," he said. "We are all guilty of this, no matter how experienced we are. We think we can make the product or service work."

Carey Randall, vice-president of communications for Citizens & Southern National Bank of South Carolina, based in Columbia, S.C., said he requests a variety of information from vendors whose services and equipment might be added to the firm's statewide T-1 voice and data network.

"Before we buy anything, we want to review the vendor's current financial statement, past annual reports and other such information," Randall explained. "If the vendor's financial data doesn't look good, we are certainly not going to deal with them."

"We are currently trying to work with a vendor that has yet to provide us with a current financial statement, and it's causing some real problems," Randall said.

Request references

Shelly Miller, a consultant with Corporate Communications, a New York-based consulting group, suggested users request user references and a meeting with the vendor's operations manager before any contract is finalized.

"The larger the chasm between sales and operations, the greater the chance the company is rocking," Miller said. "This chasm widens as a company becomes more unstable."

A meeting with the vendor's operations manager is necessary to bridge the gap between the company's sales and marketing group and their operations contingent, Miller said. "In many cases, sales will cut a contract and pass it on to operations, which has to implement it. Sometimes, the operations people will reply they can't handle the project." □

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ple bandwidth allocation is used to separate the data from the voice. Should your PBX fail, the data will not be affected.

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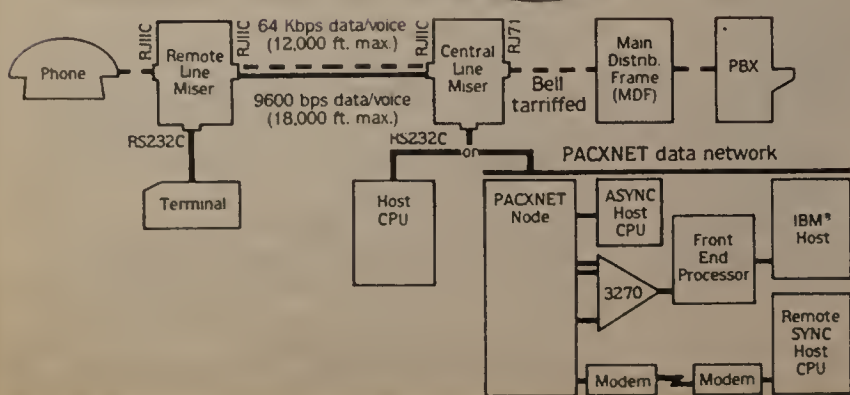
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Allnet from page 11

dropped as much as 7%. MAXCESS I is designed for large users that make more than 1,000 hours of long-distance calls per month. MAXCESS II is targeted at users that spend roughly \$2,000 to \$10,000 per month on long-distance calling. MAXCESS III, a low-end offering, is for users that amass \$250 to \$10,000 worth of calls each month.

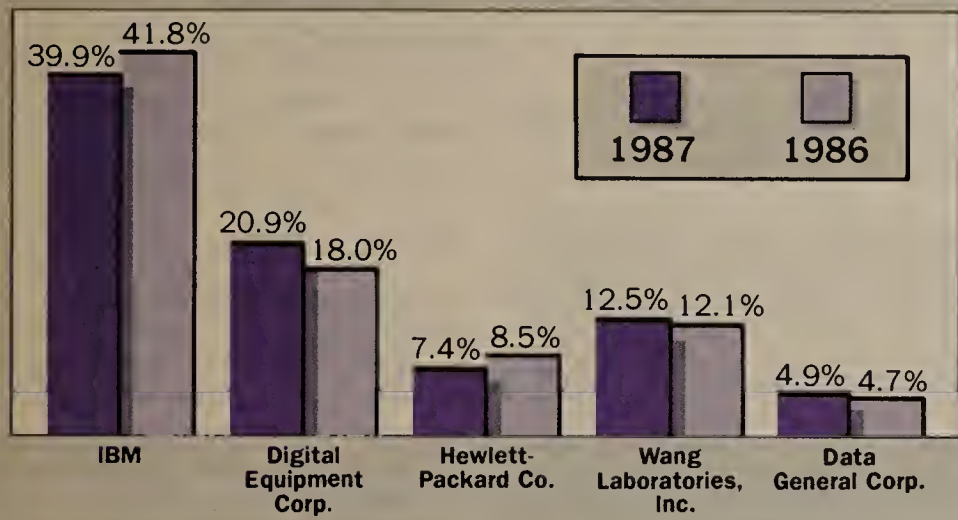
Long-distance calls placed during the daytime period, 8 a.m. to 5 p.m., and on weekends have been cut an average of 12.7%. Calls placed during the evening period, 5 p.m. to 11 p.m. on weekdays and Sundays, dropped an average of 8.8%. Allnet's night and weekend rates for calls placed between 11 p.m. to 8 a.m. on weekdays, all day Saturday and until 5 p.m. Sunday, were cut an average of 4%. □

DATA DELIVERY

“IBM faces a dilemma. If the company supports industry standards, it loses the benefits of its proprietary network architecture. If IBM ignores standards, the company will alienate a growing portion of its market.”

Howard Anderson
Managing director
The Yankee Group
Boston, Mass.

The changing landscape at the top of the departmental system market



DATA DIALOGUE

PAUL KORZENIOWSKI

What dire effects from vendor discord flow

Competition in the communications industry has forced a number of vendors to pool resources through joint marketing. Although such agreements can provide vendors with a quick fix to short-term problems, when deals go sour, users can be left sorting out messy marketing and support questions.

The communications industry is moving at a lightning-quick pace. The rapid-fire action has put a tremendous amount of pressure on established vendors who have to satisfy the needs of their current base as well as develop new products for emerging markets, according to Kim Myhre, vice-president of communications research at International Data Corp., a Framingham, Mass., market research firm. Balancing the two demands is a difficult task and is so important that decisions about how to proceed may literally determine a vendor's fate.

Established vendors often find themselves precluded from participation in emerging markets. These companies are faced with the task of retrofitting existing products and typically cannot expend the additional research and development resources required to enter markets adjacent to their mainstream businesses. Furthermore, these companies are

expected to make money every quarter.

Start-up companies do not operate under such constraints. They do not have to worry about alienating current customers with incompatible second-generation products. With a chest full of venture capital, a start-up can take the best of the current technologies, mix them in a novel manner and provide users a new type of solution.

These companies are not expected to make money and can operate at a loss for the few years needed to develop a product. Such flexibility has enabled a number of start-ups to alter emerging markets dramatically, including the high-speed dial-up modem and T-1 multiplexer markets.

One area in which the established company has an upper hand is in sales and support. Building a direct sales and support organization is an expensive proposition that few start-ups can afford.

An established company's need for new products and the start-up's requirement for marketing, sales and support often lead to joint marketing or OEM agreements. But such agreements are often short-term fixes. Established vendors may simply want to fill in a product gap as they develop their own equipment to compete with the See **Discord** page 14

STANDARDS

Vendors query need for X.32

Standard gives packet-switched nets dial-up synchronous capability.

BY PAUL KORZENIOWSKI
Senior Editor

A standard that enables users to access packet networks over synchronous dial-up lines is slowly gaining acceptance in the U.S., even as vendors debate its merits.

Last June, the Consultative Committee on International Telephony and Telegraphy completed work on the standard, dubbed X.32, which provides packet-switched network users with a number of benefits. Currently, the only way to access X.25 networks synchronously is using expensive leased lines, but X.32 supports synchronous communications over less costly dial-up lines. The standard also specifies improved security and network management functions for X.25 networks.

Despite these benefits, response to the standard among U.S. vendors has been lukewarm to date. A few small modem manufacturers claim to offer products that conform to X.32, but currently, most of their larger counterparts are only evaluating the need for such support.

Private network supplier GTE Telenet Communications Corp. currently offers X.32 service in a limited number of locations. Arch rival Tymnet McDonnell Douglas Network Systems, Inc. has been evaluating X.32 while pushing another technique, its own X.PC, for dial-up access to a packet network.

Robert Fultz, product marketing manager at Tymnet, said, "X.32 is a protocol for the future, not for the present." Fultz said most per-

See **X.32** page 14

HEWLETT-PACKARD

Monitor packages bow

Enable analyzers to track net conditions.

BY PAUL KORZENIOWSKI
Senior Editor

COLORADO SPRINGS — Hewlett-Packard Co. is expected later this month to add software packages that enable the company's protocol analyzer, the HP 4953A, to monitor bit-oriented link-level protocols such as X.25 and IBM's Synchronous Data Link Control.

The analyzer works on an X.25 network, operating at speeds up to 64K bit/sec. The software includes programmable alarms, graphic displays of statistical performance data, call records, a virtual circuit matrix and security features.

A manager can activate as many as six alarm conditions from a group of 25 basic events, all of which can be fine-tuned by user-specified parameters. The virtual circuit matrix illustrates the state of every logical channel on a network.

The product security features sound an alarm and log the loca-

tion whenever an unsuccessful attempt to enter the network is made.

The protocol analyzer's graphic information includes response times, errors, line utilization, throughput and data packet size. Other events detected include bad frame check sequence, frame rejects and unprepared receivers.

Since protocol problems frequently involve traffic load, an add-on link-level statistics package can produce two bar chart displays that help troubleshooters pinpoint line problems. A bar chart distribution of data frames helps determine if a device's buffer size has been properly configured. The link utility bar illustrates the load on a link.

The base X.25 protocol analyzer, consisting of software and an HP 4953A fitted with 001 extended memory, costs \$14,150. The link-detail report option costs \$1,200, and the SDLC option is priced at \$500. □

X.32 from page 13

sonal computer users are satisfied with asynchronous communications methods and do not require synchronous communications, which he labeled as expensive and difficult to use.

But according to Kathy Dally, senior consultant at Omnicom, Inc., a consulting and software company in Vienna, Va., there are a number of limitations to asynchronous communications methods like X.PC. She said X.PC packages data in packets but not in the typical X.25 fashion. Therefore, special translation software is required for each dial-up transmission. Also, asynchronous communications protocols are limited to low-speed communications, such as

2,400 bit/sec.

Another shortcoming is that, in an X.25 network, dial-up network facilities cannot be used to initiate a session with remote processors. The network can only establish connections with devices linked via leased lines.

That limitation poses problems for large companies with distributed processors at remote offices. Typically these processors collect data during the day. At night, the central site's mainframe can poll the remote sites, when line costs are cheapest. Often, companies cannot justify putting in leased lines between the central and remote sites. Consequently, an X.25 network would not be able to support such an application easily.

In addition to providing an alternative to asynchronous communications, X.32 also lets customers use dial-up lines to back up leased-line connections. If a leased-line link is lost, the dial-up line can be used to reestablish the link. Also, many security packages are designed for use with dial-up lines.

When X.32 support will be widely available is subject to debate. Dally noted that X.32 has been used in France for more than five years and is rapidly gaining acceptance in other European countries. She expects additional X.32 products to be announced in this country by the end of this year.

Shahid Qureshi, vice-president of research and administrative development at Codex Corp., added

that the recent emergence of V.32 modems will enable some users to experiment with X.32. V.32 synchronous modems were designed for high-speed communications, such as remote file transfers, and work over dial-up lines.

Tymnet's Fultz, however, was not as optimistic about the emergence of X.32, adding that widespread acceptance of the standard is at least a few years away. □

Discord from page 13

start-up's wares. The start-up wants revenue to build its own sales and support organization.

For example, a few years ago IBM needed a local network as the company put the finishing touches on its Token-Ring Network. IBM turned to Sytek, Inc., which was flattered to win the coveted IBM contract. On paper, Sytek's position was attractive, but the company was too small to keep pace with IBM orders, and the network maker's resources were strained.

Shortly after IBM announced the Token-Ring Network, the Sytek OEM agreement was canceled. The business loss sent Sytek reeling and could have crushed another company. Fortunately, Sytek had seen the writing on the wall and was already trying to limit its dependence on IBM. Although still experiencing some financial problems, Sytek has survived the worst of the contract withdrawal.

Similar OEM and joint marketing arrangements abound in the communications industry. Start-up Cohesive Networks, Inc. and General DataComm Industries, Inc. signed an exclusive distribution agreement a few years ago. That agreement was terminated when Cohesive was purchased by Digital Communications Associates, Inc. (DCA). Telebit Corp., which manufactures high-speed modems, recently loosened its ties to DCA.

Joint-marketing fallout can leave customers holding the support bag. Which company is responsible for support and enhancements to the products? How much help can a user expect for a dead-end product?

The risk to the customer becomes greater as the number of OEM agreements increases. Chances for long-term successful joint-marketing arrangements are slim, even when an agreement is initially successful.

A few years ago, Codex Corp. signed an OEM agreement with Avanti Communications Corp. for its Ultramux line. Avanti is now trying to determine if it wants to sell its latest high-end multiplexer through its own sales force or through Codex.

The thing to remember about OEM agreements is that companies primarily look out for their own interests. Before making a purchase, customers should ask themselves three questions. Who manufactures the product? How strong is the tie between the OEM vendors? Can the user manage if an OEM agreement turns sour and the customer is left with equipment that no one wants to service? □

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Try this network quiz.

- | | | | | | |
|----|---|--|----|--|--|
| 1. | Does your present network allow interconnection of <u>all</u> your data devices? | Yes ☐ No ☐ | 3. | Is your user interface simple enough and management info complete enough that the "HELP" phone is rarely needed? | Yes ☐ No ☐ |
| 2. | Is performance—throughput and resource usage—at optimum levels? | Yes ☐ No ☐ | 4. | Can you add devices without a network SYSGEN? | Yes ☐ No ☐ |
| 5. | Is your current network architecture an "open" one that prepares you for the current move toward standardization? | Yes ☐ No ☐ | | | |

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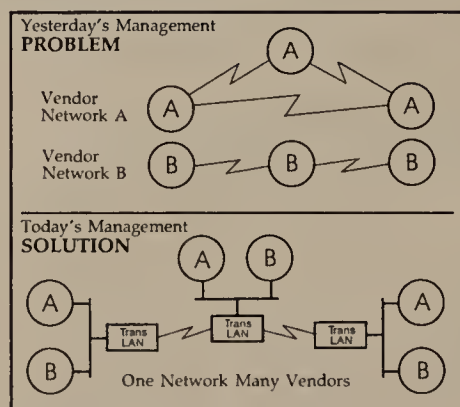
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“Apparent trends are not real trends, and real trends are seldom apparent.”

Larry DeBoever
Vice-president
Digital Consulting, Inc.

► WIDE-AREA NET

PBX net gives cost control

Bank to tie 30 switches.

BY BOB HAMEL
Senior Editor

TAMPA, Fla. — Using multiple private branch exchanges tied together by T-1 lines, the First Florida Bank, N.A. has cashed in on a telecommunications system that consolidates operations, cuts long-distance costs in half and reduces operating costs while maintaining high-quality service.

According to Sam Triplett, the bank's vice-president of telecommunications, the opportunities provided by AT&T's divestiture and deregulation and the desire to use new technology were at the core of the

See **Bank** page 16

► INFORMATION MANAGEMENT

Emerging CIO role requires dual abilities

BY BOB HAMEL
Senior Editor

Management experts agree that the chief information officer (CIO) is emerging as a key corporate figure, but they split on whether communications or MIS professionals are better suited to take on the job.

The title CIO has become something of a buzzword in recent years. Overseeing both the data processing and communications functions within an orga-

nization, the CIO strategically applies information technology to help a corporation gain a competitive edge.

Observers say many corporations are moving to consolidate control of information technology under a CIO or a number of other newly coined titles, such as chief network officer.

“The role of the CIO is emerging as companies try to marry their business strategy and technology,” said Mel Bergstein, managing director of the techni-

cal services division of Arthur Andersen & Co.

But there is little agreement among management consultants about who is on the fast track to becoming a CIO — the communications manager or the MIS manager.

Howard Frank, founder of Network Management, Inc., a start-up net management venture, agreed with Bergstein about the increasing importance of the CIO.

See **CIO** page 16

GUIDELINES ERIC SCHMALL

Evaluating the business benefits of technology

Prince Otto von Bismarck once warned that anyone who appreciates law or sausages should not watch either of them being made. Had he lived in this era, he might also have included communications technology on that list.

Although technology watching is one of the premier tasks of communications management, it has its own unsavory aspects.

Across the broad plain of technological advances, one can find the wreckage of many carefully crafted strategic plans, plans designed by those who thought they understood where the industry was going.

It is altogether too easy for managers to be blinded by hype — from vendors, pundits or other managers — about a technology's potential viability and benefits.

Communications professionals try to answer the challenge daily: How can we differentiate the real from the unreal, the useful from the useless and the inevitable from the unlikely?

A communications manager

Schmall is network systems manager for an insurance holding company.

cannot exist simply as a technology watcher. He must formulate his organization's needs to reduce communications costs, derive greater benefits from the equipment and increase competitive advantage.

If he can find a technological development that fits one or more of these categories, the manager must apply a second test: How “real” is the product?

Communications has enjoyed revolutionary change in the recent past. Even so, there is still a lot of “mirage technology” parading around as deliverable products.

Consider Integrated Services Digital Network. Here's a technology whose inevitability, benefits and eventual ubiquity are loudly trumpeted.

Salespeople already know the quickest way to strike fear into a telecommunications manager's heart is to whisper furtively that he's presiding over a shop whose private branch exchange — or front-end processor or whatever — is non-ISDN-compatible.

Despite the hoopla over ISDN trials and prototypes, the technology is still more imagi-

See **Technology** page 17

The five steps in telecommunications project management

Examine business strategy

— Match telecommunications technology with overall business objectives.

Anticipate impact

— Consider how technology changes affect the organization.

Consider overall environment

— Examine existing data base technology, hardware and software strategies.

Address key management issues

— Focus on major issues to force consensus on future direction.

Build a team

— Enlist senior management from all departments in the planning process to ensure the communications plan responds to the entire organization.

SOURCE: ARTHUR ANDERSEN & CO., CHICAGO

ASSOCIATIONS

Federal Communications Commissioner Patricia Diaz Dennis is the latest addition to the speaker lineup for the International Communications Association's (ICA) Annual Conference, which will be held May 17 to 22 in New Orleans. Dennis, who was appointed to the FCC last year, will be the guest speaker at a special open session on Thursday, May 21.

Dennis' expertise is in labor relations, as indicated by her three-year stint as a member of the National Labor Relations Board.

Prior to that, Dennis served as an assistant general attorney with ABC's Department of Labor Relations and Legal Affairs.

Dennis currently sits on the board of directors of the National Network of Hispanic Women. She has written several articles on labor law and is a past recipient of the Mexican-American Opportunity Foundation's Woman of the

Year Award of Merit.

As in past years, the ICA's Academic Development Committee will foot the bill for a number of students and professors in telecommunications attending the ICA's annual conference.

Traditionally, the ICA sponsors students and professors affiliated with colleges and universities receiving ICA funding.

The sponsorship includes airfare, lodging and complimentary conference registration for a professor and student from each university.

The sponsorship also covers complimentary lodging and registration for additional telecommunications students chosen by the participating universities.

Contact the ICA's Academic Development Committee for a listing of colleges and universities that receive ICA funding. ▢

CIO from page 15

Frank said managers with networking backgrounds are better positioned to move into CIO positions. He also said MIS and communications managers should report to the CIO, who reports directly to the chief executive officer.

Frank said he feels that getting the CIO closer to the revenue-generating aspects of the company is important.

"In most corporations today, MIS and communications are not at the core of how the corporation makes its living," Frank noted. "By not being in the core, the CIO won't have a strategic value."

Networking knowledge

According to Larry DeBoever, a vice-president at Digital Consulting Associates, Inc., networking knowledge is a vital asset for the prospective CIO.

"In information-based organizations, the competitive advantage is in networking. The winning company, and therefore the winning CIO, will be the one that transfers information the fastest and can leverage the corporate network as an advantage," he said.

DeBoever said he feels that information "is the commodity. The value is in the pipeline, the network."

"The CIO has to be someone who clearly understands technology and is not afraid of it," DeBoever said. The individual should have a good grasp of complex system integration issues, he added.

DeBoever's advice for telecommunications managers is to "quickly get up to speed on data, or their options will be limited."

He stressed getting control of local networking efforts within the company and becoming an advocate of data communications. "The single strongest leverage point for anyone is to take control of the local network," he added.

A rare kind of person

Bergstein sees the CIO as a rare kind of person. He said upper management, in looking to fill the position of the CIO, "wants someone who is business- and strategy-oriented rather than technology-oriented."

Although that does not rule out communications managers, Bergstein said he feels the problem with communications people "is that they are so engineering-oriented, they know how to do, but not what to do."

"Finding someone from a communications area who not only understands the technology but has a knowledge of corporate issues is rare," he said.

According to Dennis Conroy, a partner in charge of telecommunications consulting for Coopers & Lybrand, the people filling the role of CIO will come from the MIS side in the short term because a corporation's MIS function is more mature from a business standpoint.

Conroy views the CIO as a person who is "responsible for ensuring that information is handled within some reasonable, well-defined parameters and that the

technology that processes, supports and distributes information is reasonably compatible and can flexibly be connected."

Frank said he sees the CIO position being refined over time, and its importance within the corporate sphere won't be felt until the late 1990s.

Above all, he said he feels the position must be one of influence and control. To Frank, control "tends to be associated with budgets and the amount of influence you can wield."

A role resurrection

Herb Edelstein, a partner in the Berkeley, Calif.-based Euclid Associates, offered a different perspective. He said the post of CIO is a

resurrection of a role that was defined for the data base administrator a decade ago.

Edelstein said he sees the CIO role being filled by someone who understands the issues of data base administration, technology, data integrity and protection, as well as general business issues. He said this equates to the data base administrator.

"The data base guy already has experience in fighting these issues," Edelstein said.

"Network managers, be it data or telecommunications, are basically facilitators and don't have a grasp on all the issues," Edelstein said. "Anyone besides the data base administrator is a real dark-horse candidate." □

Bank from page 15

bank's decision to purchase its own switching equipment.

The heart of the new 2,000-line voice/data system is a network of five NEC Corp. NEAX 2400 PBXs serving locations in the tri-city area of Tampa, St. Petersburg and Clearwater, Fla. These switches were used to replace a leased GTE Corp. GTD-1000 analog switch in the bank's main location and also to support new branch locations.

Other branch offices, some with their own PBXs, are linked to these hub switches via tielines and foreign exchange lines. Ultimately, the bank will tie its 135 branches throughout Central Florida and the Gulf Coast into a cohesive wide-area network employing more than

Crosstalk Network Because Networks



30 PBXs.

With the NEAX 2400s in place, Triplett estimates First Florida is saving more than \$200,000 a year in operation costs alone. This represents a 20% reduction in the bank's communications expenditures. "We've cut costs by centralizing our operators and by optimizing our wiring," he said. "The system's call accounting also substantially reduced employee telephone misuse," he added.

The use of NEC Dterm telephones, which provide data support, is saving the bank considerable sums on wiring costs, Triplett said. When a new building was added to the bank's complex in Tampa, "we ran both voice and data through the same twisted-

pair wires. This bypassed code standards that would have necessitated using expensive Teflon-coated coaxial cable." The bank saved \$60,000 in coaxial costs alone.

First Florida Bank uses modem pooling through the switch to allow the branch personal computer users to access the bank's IBM 3090 mainframe for daily banking applications. The result has been a drastic reduction in equipment costs. "With modem pooling, the bank needs only 10% of the modems it used to need," Triplett said.

Triplett is improving operations by performing system configuration through the system administration console. "All our adds, moves and changes can be done on

one switch for every NEAX 2400 PBX. Our central site administrator can dial into the outlying switches and make configuration changes."

Central administration was one of the many features that won NEC the contract bid. "The NEAX 2400 is modularly designed," Triplett said. "It's an integrated voice/data digital switch with redundant processing. The switch's nonblocking architecture, small footprint, low power requirements and multifeature system administration capabilities swung the bank in NEC's favor."

In planning the statewide network, Triplett envisions the five current NEAX 2400s serving not only as the local network for the

Tampa/St. Petersburg/Clearwater area, but also as the hub for a wide-area network for Central Florida and the Gulf Coast.

"Over the next few years, we'll incorporate 30 switches into the hub," he said. In many cases, Triplett can integrate the existing branch office's Rolm Corp. and Siemens Communications Systems, Inc. Saturn equipment.

Since the first switch was cut over in December 1985, the system has performed admirably. "The hardware is unbelievably reliable. It's only been down once in over a year," Triplett estimates the system is handling more than 25,000 calls per day.

He said he is pleased with the decision, and his cost justification has proven correct. "Even after installing all this new technology on a system that, at 2,000 lines, is three times its former size, we're paying less today for phone service than we were two years ago," Triplett said. Long-distance costs alone are down from 28 cents to 13 cents per minute.

The cost per station and cost per employee have also been reduced. "Any way you want to look at phone service, it costs us less today than when we had the previous GTE system," Triplett said. "I absolutely love the results of divestiture and deregulation. Without that, we couldn't possibly have implemented this design." □

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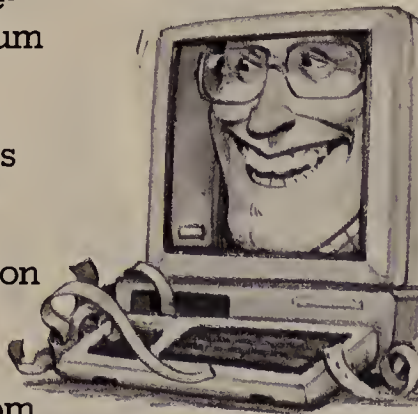
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Technology from page 15

nary than real. And although the user community regards ISDN as a messianic technology, most managers would be hard-pressed to describe it, let alone predict its arrival, potential costs or advantages.

While ISDN has all the earmarks of a technology overstudied and oversold — a watched pot that never seems to come to a boil — other technologies such as very small aperture terminals appear to have sprung up overnight.

Rapid advances in VSAT technology allowed for dramatic cost and size reductions for satellite dishes. The result has been a viable, cost-effective replacement for private-line data networks, which have been the last bastion of AT&T's lingering monopoly.

VSAT technology grew without the hype and theoretical debate that is characterizing ISDN. The trial phase for VSATs is past. VSATs are now in an intensive, competitive stage of growth and market shakeout.

In comparison to ISDN, VSAT technology is real and has perceptible benefits. Simply put, it is being used effectively.

In their important roles as technology watchers, communications professionals have to fit their department's needs to the evolving promises and products, and they must watch carefully for potential matches.

Focusing too much on the technology alone will inevitably lead a manager to chase after phantom products that will fall woefully short of fulfilling the organization's communications needs. □

PEOPLE

The National Rolm Users Group (NRUG) recently appointed four members to newly created vice-presidential positions.

Linda Virden, the manager of systems software, telecommunications information services for Macy's California, Inc. in San Francisco has assumed the

role of vice-president of membership.

Bill Hansen, the voice communications supervisor for National Car Rental System, Inc. in Minneapolis serves as vice-president of conferences for NRUG.

The role of NRUG vice-president of committees is being assumed by Frank

Schoff, the director of communications for the Chicago-based Tribune Co.

Jay Silverberg, an assistant vice-president of administration for the Eastern Bank Card Association in Lake Success, N.Y., is serving as the NRUG vice-president of administration and finance.

The North American Telecommunications Association (NATA) also recently appointed four of its members to newly created vice-presidential positions. Carrie King Downs was appointed vice-president of membership and membership services, and William Obermayer took on the role of vice-president of conventions.

Chester Lytle Sr. will

serve as vice-president of business and financial review, and William Dwyer was appointed vice-president of policy and plans.

King Downs is currently an executive vice-president with Business Telephone Systems of America, Inc. of Norcross, Ga.

Obermayer currently holds the position of executive vice-president of operations with North Supply Co. of Industrial Airport, Kan.

Lytle is the president of Communications Diversified of Albuquerque, N.M., and Dwyer is the vice-president of sales for the Shelton, Conn.-based Tie/communications, Inc.

In announcing the creation of the new vice-presidential posts, Edwin B. Spievack, president of the association, said the positions "reemphasize NATA's commitment to the needs of the changing marketplace and to the progress of technological innovation."

New York Telephone Co. recently announced the winners of the company's third annual Technical Excellence Program Awards.

The program recognizes and rewards employees whose ideas and procedures improve and expand the company's telecommunications services.

Frederic Salerno, president of the company, said the innovative technical achievements of the 32 employees would save the company more than \$33 million a year. Vincent Ciro, a district manager in the Switched Services Division, was honored for saving more than \$4 million a year in labor costs by mechanizing a manual operation in the Trunks Integrated Record Keeping System.

Mike J. Metaxas, a staff analyst in the NYNEX Service Corp., was recognized for his work in consolidating two networking centers into one location, saving New York Telephone more than \$500,000 a year.

The awards are categorized by cost reduction, technical innovation, patent development, and technical and professional writing. **■**

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Still Relying On The Old System For Network Communications?

LOCAL NETWORKING

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Want to swap your copy of Novell, Inc.'s NetWare for Banyan Systems, Inc.'s Virtual Networking System software? Tallgrass Technologies Corp. will let you do just that if you buy Tallgrass' LanCourier personal computer network server. Any authorized Tallgrass dealer will make the trade with you between now and May 15. For more information, call Corrine Smith at (913) 492-6002.

Q & A

Novell's fast track brings challenges

CEO Noorda discusses distribution, support.

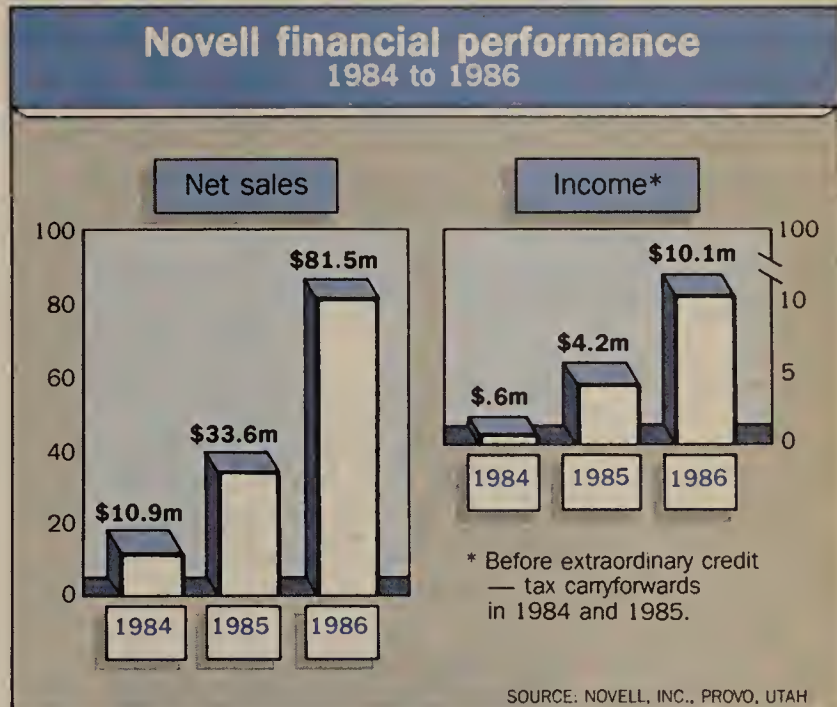
BY PAULA MUSICH
Senior Editor

Personal computer networking vendor Novell, Inc. has grown by leaps and bounds over the last few years. Revenue and net income for 1986 both increased by 143% over 1985, and the firm more than doubled the number of its employees in that period.

But growth has its costs. Novell's strategy for fueling growth has resulted in the firm's biggest problems. Using several dis-

tribution tiers has made Novell products more expensive. And because the company resells a large number of third-party products, service and support have become a nightmare.

In its bid to take control over future product direction by acquiring some of its OEMs, such as Santa Clara Systems, Inc. and CXI, Inc., Novell may also jeopardize its relationship with other OEMs. Network World Senior Editor Paula Musich talked with Novell President and Chief Executive
See Novell page 20



PC LAN LINKS

Intel's MultiServer for OpenNET bows

BY MARY PETROSKY
West Coast Correspondent

HILLSBORO, Ore. — Intel Corp. has announced a Xenix-based local network server, called MultiServer, that is designed to connect networked personal computers and terminals with minicomputers and mainframes over Intel's OpenNET network.

MultiServer is Intel's first server for OpenNET, an 802.3-compatible Ethernet-type network introduced two years ago. The network is based on a set of protocols, called Network File Access (NFA), developed by Intel in conjunction with Microsoft Corp. and IBM, according to Howard Fiderer, Intel's product line manager.

The NFA protocols are designed to handle differences in operating systems, so commands entered by users on MS-DOS-based personal computers can be interpreted by the Xenix-based server, Fiderer said. NFA is an extension of the Server Message Block protocols used in IBM's PC LAN Program. NFA is also used in other Intel products, such as VMSNET, allowing data to be exchanged with computers running the VMS operating system.

MultiServer is based on an Intel System 300 Series microcomputer, which uses the Intel 80286 microprocessor. MultiServer comes with 140M bytes of storage, 60M bytes of tape backup storage and an integrated OpenNET Ethernet controller.

The server can be configured as a file and print server, or as a file, print and communications server. The latter configuration includes an eight-line communications controller that supports protocols for both asynchronous and Binary Synchronous Communications host communications. Synchronous communications can also be supported with an optional board and software combination, the 3274SNA88.

The MultiServer also comes equipped with DOS-NETVTS, a virtual terminal program that supports a range of terminal types. Users need to purchase a corresponding piece of DOSNETVTS software for each personal computer to be supported. In June, Intel plans to offer a serial interface for OpenNET that will allow communications between remote servers via modems, according to Fiderer.

Intel is selling the MultiServer directly and through a limited number of value-added resellers. Pricing ranges from \$15,000 to \$30,000, depending on configuration. □

LANMARKS ERIC KILLORIN

When PBXs are LANs

Remember when the private branch exchange was being promoted as the linchpin of office communications? It was a kind of slicer, dicer, Veg-O-Matic local network with all the trimmings, from hundreds of call management features to megabit transmission rates over cheap wiring.

Just when you thought it was safe to go back to planning your local network installation, a resurgence of interest in voice/data integration has led some to suggest again that voice/data PBXs will indeed replace local nets. If that's the case, then the PBX suppliers should be telling potential customers to locate their switching equipment in a room full of mirrors.

It'll take quite a feat to make data run on a PBX as efficiently as it runs on a local network. The costs in software development and support time alone will be horrendous. Although networks are prone to bottlenecks, the PBXs' blocking characteristics compromise voice traffic during data communications. Imagine your dismay when you find you can't phone home because six host computers are tying up the trunk lines with megasized file transfers! This problem is the system administrator's worst nightmare.

A recent technical article in an Institute of Electrical and Electronics Engineers journal indicated how far

away voice/data integration is from reality. The journal suggested that optical fiber is the key to local networks supporting voice communications and that distributed switching modules within the PBX are the key to their support of data communications. (Ztel Corp.'s PNx used an architecture of distributed switching modules linked by a ring: great in theory, but the software burden is overwhelming.)

To support simultaneous voice and data, we need a protocol that can accommodate both and support the constant-flow nature of natural voice and sound. Studies underway at the Consultative Committee on International Telephony and Telegraphy are looking at dynamic channel allocation for running voice and data along the same media. And, protocol converters should be combined with voice/data integrated systems in order to accommodate disparate computer equipment.

Beyond these issues, we still need to understand some very fundamental concerns, such as what each layer of the International Standards Organization model will be. We need adequate software spanning all seven layers in order to make voice/data messages recognizable by both ends of the network connection. Another missing requirement is widespread installation of optical fiber in offices. Perhaps in 10 years there will be something concrete to point to and say, "That's voice/data integration." Until then, what we really need are communications products that mirror needs, not illusion. □

Killorin is the publisher of "Net-line," an industry newsletter on computer networks, a publication of Hyatt Research Corp. in Andover, Mass.

Novell from page 19

Officer Ray Noorda at Novell's recent NetWare Developers Conference about these issues and the company's perception of its role in the marketplace.

You said recently that Novell's role is to help the market grow as quickly as possible before the major players — IBM and Digital Equipment Corp. — get serious about networking personal computers. Aren't they serious now?

This business [of personal computer networking] is still a very small part of the whole, and it doesn't pay IBM or DEC to let their people at the technology, manufacturing and sales levels get too excited about it.

That would divert their focus away from what they really sell: shared processor/MIS products. Each has a toe in the water, and they're feeling the pressure, but they can't afford to make big changes too quickly. PCs are a commodity-type product. It just doesn't pay for them to get involved in PC LANs too deeply because that would compete with their main business of selling shared processors.

Why is it Novell's job to spur market growth?

We're really part of DEC's and IBM's business in the long term because we're in the same office and factory environment as they are. But we employ a 'PC-centric' view

of the MIS world based on distributed processing using personal computers. [Personal computers are the main focus, with connectivity extending out from the desktop to larger processors.]

They've thus far offered low-performance PC networking capability, such as MS-Net, that's non-threatening to their main business. We think the world deserves something better than that. Customers are demanding something better since they recognize there is something better, like NetWare.

We think it's our job to help that part of the business grow fast, and in growing fast, those participants hopefully will be large enough when IBM and DEC get really serious about it — from the standpoint of high-performance PC networking — that they'll be able to sustain their business.

Novell customers still complain about the service and support they receive for Novell and NetWare-compatible products. What is Novell doing to change that?

There are still some serious complaints by some people. Generally speaking, they come from the fact that so many people sell our product. In selling to OEMs, distributors and dealers with two tiers, and to a lesser extent, to retail chains, we have a very broad distribution path. It's much broader than some of the others in the business, such as 3Com Corp. [In the first quarter of 1987, Novell sold 56% of its products to distributors; the rest were split among dealers, value-added resellers, retailers, OEMs and direct sales to end users.]

We also have a broad range of products — our own and those of 30 OEMs — compared to other vendors. This allows a customer who wants to assemble his system on-site to pick and choose software from one OEM, hardware from another and service from another. A lot of people are doing that. In that respect, we have a disadvantage in being so broad.

We started our NetWare Services Division in response to this type of customer. Our LANswer service [the foundation for the division] takes a question on any NetWare product bought from whomever. Even though we don't always have the responsibility to get an answer back, we find a way to do that. If it's not from us, it has to be from someone else.

I think we're starting to improve the situation, but I think we're a long way yet from solving all the problems that can happen. We've created enough of our own problems by introducing a string of new products, not to mention that whole conglomerate of sales channels through which additional problems can grow.

We're also adding more training and a lot more third-party support capability in the field. We're using [Control Data Corp.] and looking for two or three others.

There have been a lot of rumors recently about plans to

eliminate the distributor channel from your distribution strategy. Are they true?

We've provided a lot of products to our distributors that they otherwise wouldn't carry, which is very expensive.

To bring their costs down, they've gone around us to our suppliers to get the lowest prices. So, we've reclassified distributors. We will turn them into NetWare distributors — which means they'll primarily distribute software.

We've given them the option to band together in larger groups, which they've already done, and buy as a single group to get increased discounts on software. Then, hopefully, they will continue to sell to dealers and continue to buy the hardware products from other people.

In the meantime, we have to start moving more toward the dealer. We're not cutting the distributor out, but we're effectively making them a competitor with us for that dealer. We're pricing our products and providing service so they can continue to do that.

In the longer term, this will mean that one of the tiers in our distribution strategy will diminish in importance; therefore, our end-user price will come down. If you look at our products, typically we are priced at the end-user level, 10% to 25% higher than other people supplying the market. That can't last forever.

Much of your growth has resulted from the broad-based relationships you've developed with third-party vendors. By acquiring some of your OEMs, aren't you potentially damaging the relationship you have with others?

If they look at it superficially, perhaps. We're not trying to grow just by doing that. We acquired Santa Clara Systems, for example, because we understand them well. They had experience in the low-cost end of the market with their so-called PC Terminal, and we felt they were an important factor in our pushing costs down.

They also happened to be in the San Francisco Bay Area, which enabled us to do the fast-turn things that we do, meaning start up an Ethernet line, for example. We don't plan on staying in it very long, but we wanted to get it going because our job is to get the cost down. It's the same thing with the diskless PC. They had the experience, and they knew how to work with the Koreans. If we never make a nickel selling that product, that's OK. If it helps drive the cost of that desktop product down, that's what we're interested in.

They also happen to be well-located to bring in the products that we currently buy offshore and bring in here to Provo, [Utah]. Here, we're a long way from the point of entry, and it takes our focus off of what we really should be doing, which is proprietary products. Santa Clara Systems also provides us with quick accessibility to the technology people who are over in the Bay Area at every level of support. ▢

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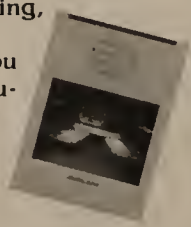
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▶ VOICE RESPONSE

AspenLink gives Octel data entry

Voice mail adjunct makes phones act like terminals.

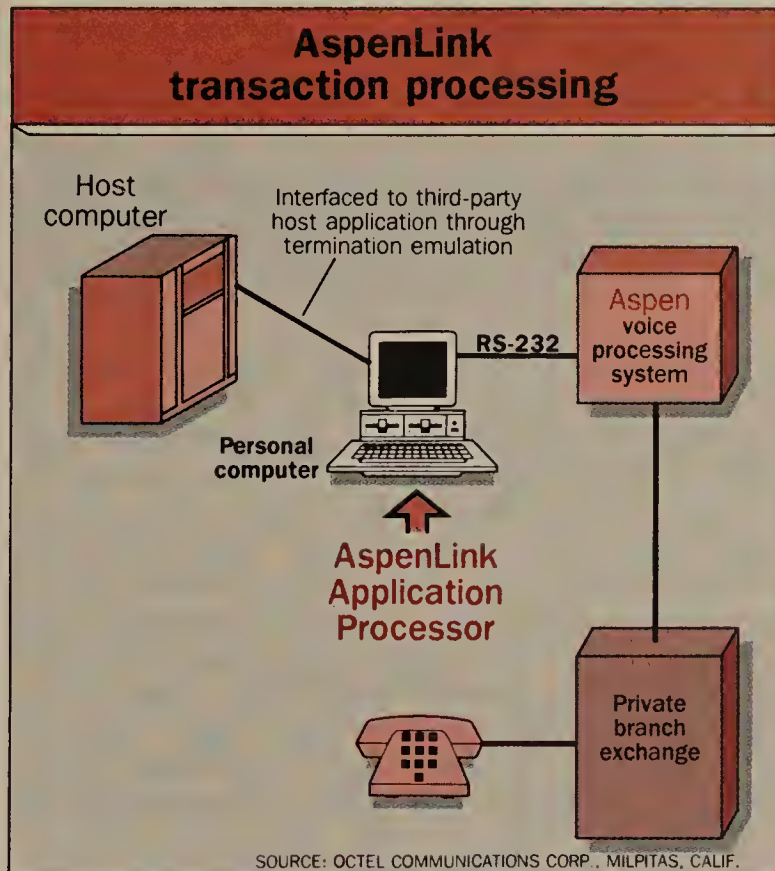
BY JIM BROWN
New Products Editor

MILPITAS, Calif. — Octel Communications Corp. recently released AspenLink, a personal computer-based adjunct to the company's Aspen voice mail systems that enables customers to use their push-button telephones as terminals to access host computer data bases.

The AspenLink program runs on a customer-provided IBM Personal Computer. Basically, the program acts as an interface that receives commands and data entered from a push-button telephone and passes them to a concurrently operating personal computer program developed for specific types of applications by third-party vendors.

The third-party applications access the host through terminal-emulation software and adapter boards. The first such application was developed by Oklahoma City-based Innovative Computing Corp. and was released in conjunction with AspenLink.

Innovative Computing, a software developer for the transportation industry, offers ITS Link for use with AspenLink to enable truck drivers to interact over the telephone with its Innovative Transportation System application. The application asks drivers to enter numeric commands to report their locations and trip-progress information — data that can then be accessed by dispatchers. The application reduces the time a driver needs to be on the telephone by eliminating the need to talk directly to a dispatcher.



A typical AspenLink transaction begins when a call is routed from the private branch exchange or Centrex service to an Aspen voice processor. Aspen answers the call with a prerecorded message and determines if the call is destined for AspenLink by asking the caller to enter a code.

AspenLink presents the call to the third-party application. The application invokes a routine that uses AspenLink to instruct the Aspen voice processor to play various recorded voice messages to the caller. Those messages may, for example, present the caller with a list of menu options and then ask the caller to enter commands or data through a push-button keypad.

The Aspen voice processor collects the information from the caller and passes it through AspenLink to the third-party application. The third-party application may then connect to the host system and enter new data or retrieve existing data. When retrieving information, the package will instruct AspenLink to have the Aspen voice processor play one of a number of stored messages to the caller.

AspenLink will concurrently process as many calls as the Aspen voice processor itself, a figure that

See **AspenLink** page 27

▶ DATA SWITCH

Able MINX enhances Mux Master

BY JIM BROWN
New Products Editor

COSTA MESA, Calif. — Able Computer recently announced a hub unit that allows users of its asynchronous Mux Master family of products to switch connections between a number of hosts, printers and other peripherals.

Configured in a star topology, the firm's 480-port Micro Integrated Network Exchange (MINX) extends the capabilities of the Mux Master products, which previously were used to multiplex connections between terminals and hosts.

The desktop unit features distributed networking, centralized network management, network diagnostics, password security, port contention, load balancing, multiple connections and queuing.

The MINX provides four 1M bit/sec twisted-pair wire links, each of which can support a string of multipoint Mux Master terminal, printer and host servers, totaling 128 user ports. Port speeds on the servers go up to 38.4K bit/sec.

Both eight- and 16-port Mux Master terminal servers, which support RS-423 and RS-232 interfaces, and single-port printer servers, which support parallel printer protocols, can be connected to a MINX link.

Terminals, printers and hosts can be located up to 2,000 feet away from the MINX. Able said that distance can be extended to 6,000 feet with fiber-optic modems, and to seven miles with T-1 links.

Host interfaces include a single 128-port server for Digital Equipment Corp.'s Q-bus and Unibus computer systems.

The MINX uses a High Level Data Link Control protocol to perform error checking and correction for transmissions over the twisted-pair links. The device will also allow users to establish multiple connections and will create a queue for users wishing to connect to a busy device.

The MINX is initially configured using a terminal attached to an administration port. Future administration, including system configuration and diagnostics, can be performed from any terminal.

MINX supports up to 128 classes of service, thus letting authorized

See **Able** page 27

▶ NETWORK RESEARCH CORP.

Fusion software links VAX nets

BY JIM BROWN
New Products Editor

OXNARD, Calif. — Network Research Corp. recently released add-on modules that allow its Fusion Network Software to link remote Digital Equipment Corp. MicroVAX II and VAX minicomputers attached to remote local-area networks.

The Fusion Network Software add-on modules emulate DEC DMR-11 and DMV-11 high-speed controllers. They support file

transfers between DEC MicroVAX and VAX systems using the Transmission Control Protocol/Internet Protocol.

By implementing TCP/IP file transfer protocols, the DMV-11 option allows remote MicroVAX II microcomputers to transfer files at up to 56K bit/sec, while the DMR-11 option allows remote VAX minicomputers to transfer files at speeds up to 1M bit/sec in point-to-point applications. The add-on modules can also be used to transfer files between local

VAX clusters.

The DMR-11 and DMV-11 are available as add-on options to the Fusion Network Software Version 3.1.13 running under the DEC VMS operating system using TCP/IP. Pricing begins at \$720 for the MicroVAX II, \$1,200 for the VAX 700 series of minicomputers and \$1,800 for the VAX 8000 series of minicomputers.

Network Research Corp. is headquartered at 2380 N. Rose Ave., Oxnard, Calif. 93030 (805) 485-2700.

As networking takes over the world, Network World takes over the market.



The trend has never been clearer. Networking is now the major application market for communications. And a recent statement by Ken Olsen, President and Founder of Digital Equipment Corporation, substantiates this trend: "We have to start thinking of the computers as peripherals. You start with the network, then you hang the computers on later."

Networking. It's been *Network World's* focus from the very start.

In fact, it is the *only* publication that covers the entire realm of communications from the networking point of view. And in doing so, *Network World* has established itself as the *standard* for communications users already networked or planning to network.

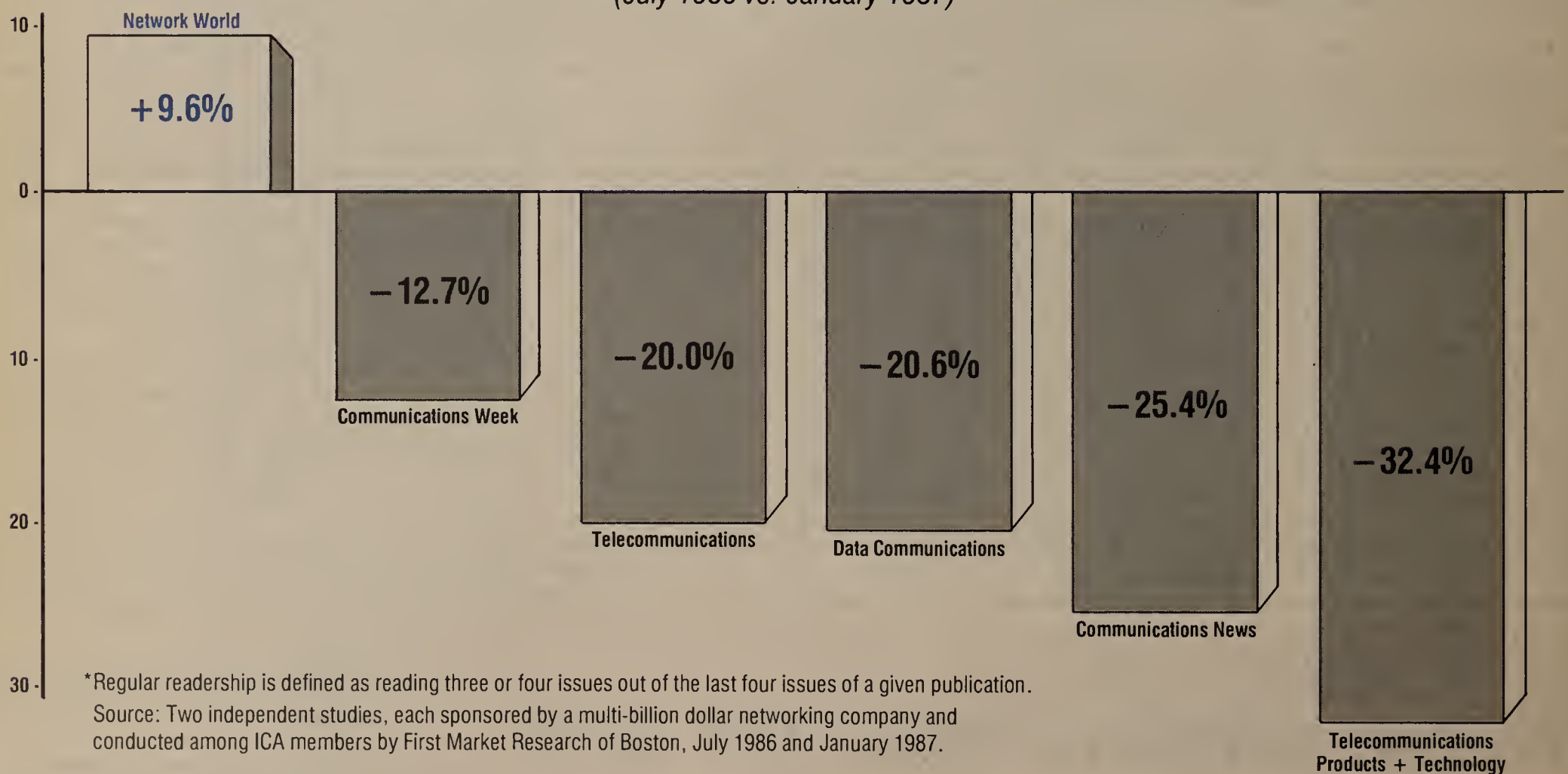
Today's users know they need up-to-date information in order to keep pace with the evolving world of networking. That's why they read *Network World*. And that's

why *Network World* was the only publication to gain in regular readership in an independent study conducted among ICA (International Communications Association) members, some of the nation's most influential buying decision-makers for voice and data communications products and services.

The study, sponsored by a multi-billion dollar networking company and conducted in January 1987 by

First Market Research of Boston, showed decreased readership of all communications oriented publications among ICA members since a previous study in July 1986. Only *Network World*, with its exclusive networking-oriented coverage, experienced an increase in regular readership. The percentage increase/decrease for each publication over that six-month period is displayed in the following chart.

Percentage Change in Regular Readership* among ICA Members
(July 1986 vs. January 1987)



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Products & Services

SNA devices linked over X.25 network

Advanced Computer Communications (ACC) announced a device that allows IBM Systems Network Architecture systems to use X.25 packet-switched networks.

The eight-port **ACS 1030** can be used to connect IBM host computers or to link multiple IBM 3274 Cluster Controllers to an IBM host over an X.25 network. The ACS 1030 connects to the host over existing lines supported by an IBM 3705 or 3725 front-end processor. At the remote site, the ACS 1030 connects to RS-232 ports on such devices as an IBM 3274 Cluster Controller supporting a number of 3278 terminals. Accepting Synchronous Data Link Control or asynchronous protocols, controller and terminal devices can communicate with the ACS 1030 at speeds up to 64K bit/sec, while the ACS 1030 communicates over the network at speeds up to 100K bit/sec.

The eight-port ACS 1030 costs \$15,000. ACC plans to release a four-port ACS 1020 later this year.

Advanced Computer Communications (ACC), 720 Santa Barbara St., Santa Barbara, Calif. 93101 (805) 963-9431.

EasyLAN made NETBIOS-compatible

Server Technology, Inc. added IBM Network Basic I/O System compatibility to its EasyLAN package, which connects up to 20 IBM Personal Computers over RS-232-C wiring, and released its first NETBIOS application package.

In addition to NETBIOS compatibility, **EasyLAN Version 3.0** also includes four new network commands. The firm also released EasyCALENDAR, a calendar and time-management application operating over the EasyLAN network.

With NETBIOS, EasyLAN-connected personal computer users can access and run NETBIOS applications as well as develop their own NETBIOS-compatible local net applications. EasyLAN uses RS-232-C wiring instead of network adapter boards and coaxial cable to connect personal computers. Based on a star topology, EasyLAN requires one personal computer to serve as

a hub equipped with an RS-232-C port for each personal computer on the net.

The four new network commands include a routine that lets a hub-resident date and time board set the date and time on each connected personal computer. A routine that alerts users

that a file is about to be transferred to them or has arrived at their personal computer was also added, as was a routine letting a user create or delete sub-directories on a remote personal computer. Existing EasyLAN users can upgrade to the non-copy-pro-

tected Version 3.0 for \$25. A single copy lists for \$99.95, while a kit containing wiring and software to connect two personal computers sells for \$219.95.

Server Technology, Inc., 1095 E. Duane Ave. No. 103, Sunnyvale, Calif. 94086 (800) 835-1515 or,

in California, (408) 738-8377.

Protocol analysis package released

Tekelec, Inc. announced an Automatic Link Access See Protocol page 26

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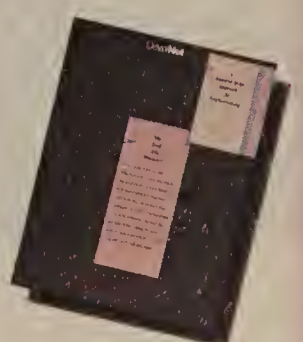
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and software made by different manufacturers. Even MS*-DOS and AT&T's UNIX® System V workstations are able to share information and resources, giving users easy access to one another's files.

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Products & Services

Protocol from page 23

Procedure D (LAPD) application package for its Chameleon 32 Multi-Protocol Test and Development System.

Based on the Chameleon Simulated Interactive Multi-Protocol Language (SIMP/L), the **SIMP/L LAPD** package allows users to configure the Chameleon 32 to emulate any protocol that uses a LAPD link level.

The package includes commands for automatic transmission, reception and analysis of the Q.921 frame level, leaving users with more time to devote to Levels 3 and above of the LAPD protocol. These levels are programmable with the SIMP/L LAPD package.

Using the package's programming capabilities, users can create mnemonic tables to define field widths. They may also specify values for the LAPD Management Entity Identifier, Reference Number, Message Type and Action Indicator.

The package runs in full-duplex at speeds of 64K bit/sec. A maximum frame length of 512 bytes is supported.

The SIMP/L LAPD software package costs \$695.

Tekelec, Inc., 26540 Agoura Road, Calabasas, Calif. 91302 (800) 835-3532. For California and Alaska residents, (818) 880-5656.

Northern Telecom expands test tool line

Northern Telecom, Inc.'s Spectron Division recently released a plethora of new diagnostic and network control products.

The **Datascope 4000** protocol analyzer monitors data at speeds

up to 110K bit/sec. It includes 1.6M bytes of internal disk storage. The \$6,990 unit features a 400K-byte input buffer, X.25 and IBM Systems Network Architecture analysis, terminal emulation, a menu-driven operator interface and BASIC-like programming language supporting 37 commands.

The company also introduced **limited distance modems** that support speeds up to 19.2K bit/sec over distances of up to 10 miles. Capable of data terminal equipment or data communications equipment operation, the modems feature analog and digital loop-back testing. A 110-volt synchronous version costs \$159, and a 220-volt version costs \$179. A 110-volt asynchronous version costs \$139, and the 220-volt version is \$159.

The **MIS-3800** allows up to eight devices to share a single modem and includes transmission speeds of up to 9.6K bit/sec, adjustable channel-scan rate, port enable and disable switches, and port activity indicators. A 120-volt model costs \$590. A 220-volt model costs \$630.

The **MER-800** short-range modem eliminator and repeater connects data terminal devices located up to 800 feet from each other. Features include synchronous transmission at up to 38.4K bit/sec, loop-back diagnostics and front-panel diagnostics. A 120-volt model costs \$179 and a 220-volt model costs \$219.

The handheld **DTS-10 Data Test Set** is used for testing 25-pin RS-232 data interfaces. It provides bit error-rate testing, data terminal equipment or data communications equipment simulation, data format evaluation, bias distortion measurement, pulse trapping and multidrop polling. It costs \$1,100.

The handheld **DTS-20 Data Test**

Set includes an integral four-inch CRT display screen and is designed to monitor and analyze RS-232 data lines running at 64K bit/sec. Features include automatic configuration, bit-error rate testing and a programming language. The device costs \$2,750.

The briefcase-size **DTS-30 Data Test Set** can monitor and analyze RS-232, V.35 and RS-449 circuits operating at speeds up to 128K bit/sec. The \$5,400 device has a 672-character LCD display screen and a micro-floppy disk drive.

The **ETS-1 and ETS-2 Bit Error-Rate Test Sets** transmit a known pattern of bits or blocks over asynchronous and synchronous network lines in order to isolate the cause of a communications problem. Used in loop-back or end-to-end mode, the ETS-1 supporting RS-232 networks costs \$395, while the ETS-2 supporting V.35 networks costs \$795.

The company released a family of **protocol converters** for use in IBM SNA, Binary Synchronous Communications and 5250 environments. The units range in size from four ports to 32 ports and feature line concentration, protocol conversion, automatic log on and log off, and password security. The SNA unit provides an SNA gateway to any ASCII terminal at speeds up to 19.2K bit/sec. The price of the protocol conversion units begins at \$4,975.

The firm's **Analog Test Set** measures transmission levels, frequency and noise on voice grade, specially conditioned and program analog circuits with up to 20 KHz of bandwidth. The device costs \$1,685. The **TIP-424 Voice Frequency Patch Panel** allows backup modems substituted for faulty units and circuits to be bridged to

monitoring equipment, without interruption of service. The product costs \$500.

The **Remote Switch Controller** allows network managers to operate up to 1,024 remote or local Spectron Digital Switch Units (DSU) or Digital Switch and Patch (DSP) units from a central site. DSU and DSP units control the telephone line to which terminals, modems, multiplexers and cluster controllers are attached. A central-site master remote switch controller, which may be a Digital Equipment Corp. VT-100-compatible terminal using an RS-232 interface, controls devices attached to remote slave controllers. A master controller costs \$1,500, a slave controller costs \$1,300, and a selector costs \$1,000.

Lastly, the firm introduced the \$5,000 **DSP-2423IA Digital Switch Patch**, which adds integral alarm capability to Spectron's DSP product line, and its \$3,000 **Universal Digital Patch Units**, which provide monitoring and test access to data ports using RS-232, V.35, or X.21 interfaces.

Northern Telecom, Inc., Spectron Division, 8000 Lincoln Drive, Marlton, N.J. 08053 (609) 596-2500.

LM1 Line Monitor enhanced; new packs out

Progressive Computing, Inc. enhanced its LM1 Line Monitor by increasing its operating speed to 72K bit/sec, introducing a V.35 interface for the unit and releasing packages that analyze X.25 and IBM Systems Network Architecture protocols.

The LM1 Line Monitor, an IBM Personal Computer add-on board, will now monitor data lines operating at speeds of 72K bit/sec. Compatible with IBM's Enhanced Graphics Adapter and Hercules Computer Technology graphics adapter boards, the LM1 presents displays that are reportedly nearly equal to dedicated line monitors.

In order to support the higher speeds, the company released a **V.35 Interface** for the LM1. Also released were **X.25 Protocol Software** and **SNA Protocol Software** that run in conjunction with the LM1. The packages make the LM1 line monitor act as a protocol analyzer that decodes all levels of X.25 and SNA protocols.

The LM1, containing 32K bytes of memory, displays up to 1,600 characters. It runs at 72K bit/sec on an IBM Personal Computer AT and compatibles, and on personal computers operating with an 8 MHz processor.

The device has a full-duplex operating speed of 38.4K bit/sec and a half-duplex operating speed of 64K bit/sec on personal computers operating with a 4.7 MHz processor. Requiring DOS 2.10 or higher and 256K of random-access memory, the LM1 can also be used for mixed-mode monitoring or emula-

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tion of data terminal equipment or data communications equipment.

The V.35 interface for the LM1 costs \$595. The X.25 and SNA Protocol Software each cost \$295, while the LM1 is priced at \$1,595.

Progressive Computing, Inc., 28 Greenwood Court, Glen Ellyn, Ill. 60137 (312) 790-3730.

Telematics adds to Net 25 line

Telematics International, Inc. announced four additions to its Net 25 line of network control and

management products, which is based on Telematics' Programmable Communications Processors (PCP).

X.75 Gateway software allows communications between two public or private packet-switched networks. The product is compatible with the 1980 CCITT X.75 recommendations and costs \$9,000.

SDLC-XS Access software enables IBM Systems Network Architecture/Synchronous Data Link Control devices to communicate across X.25 packet-switching networks.

The product operates on the

firm's PCP concurrently with other X.25 Net 25 Access packages. It supports both primary and secondary station call initiation and costs \$3,600.

Enhanced system software provides PCP and **Line Processing Module** application developers with precoded and pretested development libraries. The development libraries support development of user communications applications using Assembler, Pascal and C languages.

The development libraries cost \$2,250.

The firm's **Backup System Sup-**

port Facilities allow a secondary PCP to take over operation upon failure of the primary PCP. Available as an option to the Telematics Series 1000 and Series 2000 PCPs, the package requires the primary and secondary PCPs to be linked over dedicated communications lines. The secondary PCP will detect the failure of the primary unit and transfer all operating files to it.

Available in June, the product costs \$4,500.

Telematics International, Inc., 1415 N.W. 62nd St., Fort Lauderdale, Fla. 33309 (305) 772-3070.

AspenLink from page 21

ranges from four to 72 concurrent calls, depending on which Octel system is used — Aspen, Aspen Branch or Aspen Maxum.

The AspenLink transaction processor uses Aspen Command Language to pass control information between the Aspen system and the third-party application running on the personal computer.

Currently, Octel officials said, the AspenLink transaction processor will communicate through terminal emulation with IBM System/36 and System/38 minicomputers as well as IBM mainframes.

AspenLink is compatible with emulation products offered by AST Research, Inc., Digital Communications Associates, Inc. and IBM. These products make personal computers appear to the host as terminals used in either a 5251 or 3270 environment.

Priced as an option to Aspen, the AspenLink transaction processing application costs \$10,000 for the four-to-eight-port Aspen Branch; \$15,000 for the four-to-24-port Aspen; and \$25,000 for the 16-to-72-port Aspen Maxum.

Octel Communications Corp. is located at 890 Tasman Drive, Milpitas, Calif. 95035 (408) 942-6500.

Innovative Computing Corp., whose ITS Link ranges from \$5,000 to \$10,000, is located at 4411 Highline Blvd., Oklahoma City, Okla. 73108 (405) 949-9070.

Able from page 21

users perform system administration tasks from designated user ports. As part of their class of service, the MINX will present users with a menu of the authorized switching options.

In addition, the MINX supports multilevel password security. It will restrict access to certain devices on specified days or at specified times. The system can be configured to terminate dial-up connections after a specified number of password failures.

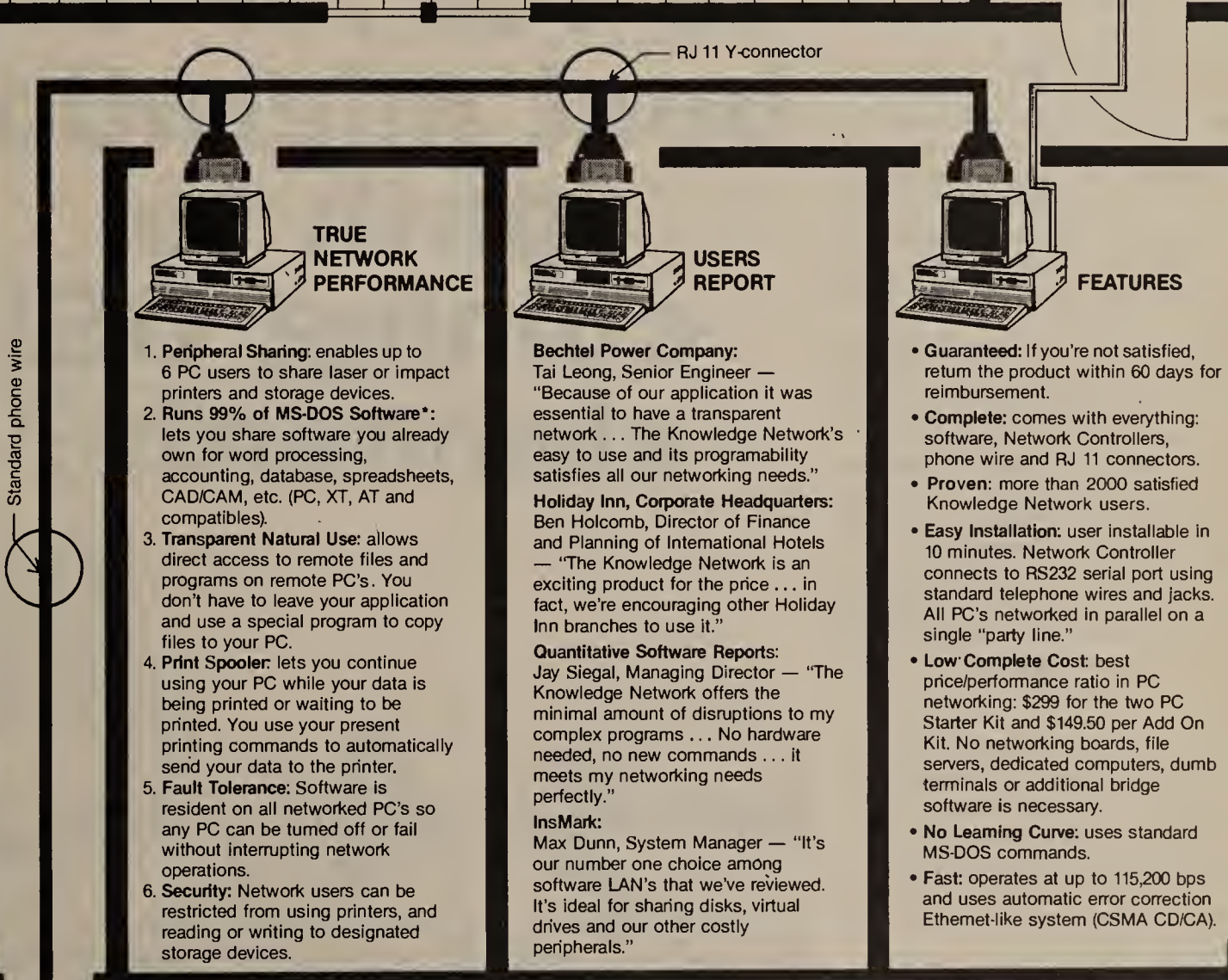
The MINX Supervisor software supports diagnostic routines that test the four MINX links as well as user ports and attached servers.

Available from Able Computer, 3080 Airway Ave., Costa Mesa, Calif. 92626 (714) 979-7030, the MINX is priced at \$5,000.

The Small Office LAN

User-Friendly, Full-Featured, 6-PC Networking Solution

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The diagram illustrates a Small Office LAN setup. A central network controller is connected to six PCs via RJ 11 Y-connectors. A laser printer is also connected to the network. The setup is labeled 'Standard phone wire'.

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USERS REPORT

Bechtel Power Company:
Tai Leong, Senior Engineer — "Because of our application it was essential to have a transparent network... The Knowledge Network's easy to use and its programability satisfies all our networking needs."

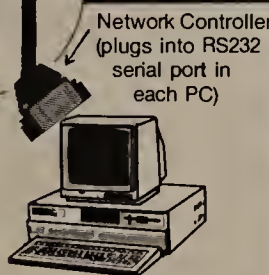
Holiday Inn, Corporate Headquarters:
Ben Holcomb, Director of Finance and Planning of International Hotels — "The Knowledge Network is an exciting product for the price... in fact, we're encouraging other Holiday Inn branches to use it."

Quantitative Software Reports:
Jay Siegal, Managing Director — "The Knowledge Network offers the minimal amount of disruptions to my complex programs... No hardware needed, no new commands... it meets my networking needs perfectly."

InsMark:
Max Dunn, System Manager — "It's our number one choice among software LAN's that we've reviewed. It's ideal for sharing disks, virtual drives and our other costly peripherals."

FEATURES

- Guaranteed:** If you're not satisfied, return the product within 60 days for reimbursement.
- Complete:** comes with everything: software, Network Controllers, phone wire and RJ 11 connectors.
- Proven:** more than 2000 satisfied Knowledge Network users.
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- Low Complete Cost:** best price/performance ratio in PC networking: \$299 for the two PC Starter Kit and \$149.50 per Add On Kit. No networking boards, file servers, dedicated computers, dumb terminals or additional bridge software is necessary.
- No Learning Curve:** uses standard MS-DOS commands.
- Fast:** operates at up to 115,200 bps and uses automatic error correction Ethernet-like system (CSMA CD/CA).



Network Controller (plugs into RS232 serial port in each PC)

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1095 E. Duane Ave.
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Sunnyvale, CA 94086
(408) 739-0300



Harry Coin, designer of the Knowledge Network:
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1 PC Add On Kit \$149.50 each (1 RS232 Network Controller, phone wire, RJ 11 connector, software and manual)	
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Sub total	
CA residents add applicable sales tax	
TOTAL	

Payment or Charge: ☐ VISA ☐ MC ☐ AMEX ☐ Check

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Opinions

No question about it, Open Systems Interconnect (OSI) or something like it is coming, and it's certainly needed.

Imagine a single, worldwide, standard networking protocol that enables virtually any brand or size of computer, with virtually any operating system, to talk with any other. Imagine eliminating the need for magnetic tape or rekeying when transferring data from one computer system to another.

Imagine simplified electronic mail and transfer of data files. Imagine an easy way to share expensive peripherals such as laser printers or optical storage systems.

But don't imagine it happening too soon. OSI is a long way off. Only the first layers — 1 through 4 — of OSI have been standardized so far, and upper layers are years away. The whole project is in such a state of flux today that users cannot create large commercial networks using the OSI layers because the upper layers don't exist yet.

It will be two to five years before complete OSI products arrive, and it will be a decade before OSI supports enough processors to permit organizationwide networking for most users. In the meantime, users are still building networks, but what building materials should they use?

Transmission Control Protocol/Internet Protocol is the Wollongong Group's choice, and it is also the choice of people at institutions such as Hewlett-Packard Co., Sun Microsystems, Inc., the Department of Defense and the National Science Foundation.

The following are 10 reasons why TCP/IP is the way to migrate toward tomorrow's international networking standards:

- TCP/IP is established and in use today.
- It's widely supported, both by government and by large segments of the computer industry.
- TCP/IP is in layers, as the future international standards will be. Therefore, users can migrate either one layer at a time or a few layers at a time.
- With TCP/IP's layered approach, a network protocol can accommodate features and technology that haven't been dreamed up yet but are sure to come.
- TCP/IP is an open, nonproprietary architecture.
- Few, if any, of the hardware or software elements of a TCP/IP network will have to be removed or disabled to implement an OSI

Ladermann is vice-president of the Wollongong Group, a network systems vendor in Palo Alto, Calif.

PRO:

BY DAN LADERMANN
Special to Network World

network later, since the TCP/IP protocols map almost identically to the OSI protocols.

■ Because OSI will be in the public domain,

vendors supporting TCP/IP will later be able to provide their users with OSI products that will complement or replace their current offerings.

■ Present proprietary protocols, such as Digital Equipment Corp.'s DECnet and IBM's Systems Network Architecture, are tightly integrated with their own hardware and operating systems. They work wonderfully as long as the user stays with that hardware and proprietary operating system.

But in the real world, users often face multivendor environments where proprietary schemes

See **PRO** page 29

Transmission Control Protocol/Internet Protocol is not the best migration path to Open Systems Interconnect (OSI).

TCP/IP and its related utilities

today provide a fairly complete set of interoperating communications functions to a variety of host computers and communications media.

Also, TCP/IP is significant as a primary "open systems" environment, and, until now, it could be argued that it has been without comparison for accomplishing interoperability between a variety of equipment. But TCP/IP is not OSI.

TCP/IP is an ad hoc standard that has grown with time. Its ori-

Sullivan is staff software engineer at Data General Corp. in Westboro, Mass.

CON:

BY THOMAS G. SULLIVAN
Special to Network World

gins lie in the Department of Defense's Advanced Research Projects Agency Network (ARPA-NET). Because of its wide support on a variety of

computer architectures, it has become the communications protocol suite of choice in the UNIX world.

TCP/IP does provide the proper services for OSI's first physical, link, network and transport layers. However, the implementation of network and transport layer services is not accomplished with the same protocols or interfaces specified for OSI, although the network layers of both are quite similar. As a result, TCP/IP will not interoperate with machines running OSI protocols.

In addition, OSI provides further services that are not addressed as formal layered abstractions by TCP/IP. Above the OSI transport layer are the session, presentation and application layers.

The purpose of the session layer, simply stated, is to provide basic end-to-end transactions across a network. Transactions can be bounded, and the bounded data stream can be restarted from a previous boundary point.

The presentation layer provides standard ways to "present" data and provides for common architecture and application-independent representation of data.

The application layer provides a standard interface for networking applications — called ACSE, for Association Control Service Element — thereby allowing for greater portability of applications from machine to machine.

There are also standardized applications such as FTAM for file transfer, X.400 for electronic messaging and VTP for virtual terminal access. Applications exist for network management, though they are still being defined. None of these are compatible with existing TCP/IP services.

This means that any software investment in TCP/IP will be lost when switching to a true OSI environment. The best that can be hoped for is the ability to run the two protocol suites simultaneously, allowing access to newer OSI hosts and older TCP/IP hosts.

The Department of Defense's Advanced Research Projects Agency (DARPA) has asked that TCP/IP be migrated to OSI protocols, but such changes will require complete renovation of what now exists and will take years to implement. By that time, true OSI products will be available.

Still, the question remains: What should be done if an immediate solution is required for multivendor interoperability? For many users, TCP/IP could be an

THE ISSUE

Is TCP/IP the best migration path to coming OSI standards?



Opinions

► TELETOONS — By Phil Frank



excellent fit. But, as stated above, this track could lock unwary users into soon to be outdated technology. Fortunately, other alternatives are now emerging.

Most major computer manufacturers now have Manufacturing Automation Protocol-compliant products, or they will be introducing them within the next year. MAP is based on OSI, and it supports all layers with a subset of available OSI features.

Since MAP is the first widely recognized true OSI implementation, MAP compliance will be an important feature of any OSI product that will emerge in the near future.

While MAP has been developed for the manufacturing market, its sister protocol suite, the Technical and Office Protocol, is being developed specifically for the office environment. Because both use essentially the same OSI subsets, there will be a high degree of compatibility between them. Therefore, if users can wait a few months, true OSI networking products will be on the shelf.

Another important existing standard that is compatible with OSI is X.25, as amended in 1984.

See **CON** page 43

PRO from page 28

become slow and cumbersome. Users must advance to a nonproprietary operating system, which will cross easily between manufacturing and operating systems.

■ TCP/IP software is already heavily in use today for communication between workstations — including personal computers — and other processors linked to mainframes and departmental systems.

It provides standard applications through OSI Layer 7, including file transfer, virtual terminal, electronic mail and custom applications such as distributed file systems and distributed data base applications. And this usage will grow.

■ TCP/IP is quite friendly. With TCP/IP, a user at a workstation can easily connect to a departmental system. Logging on and starting work takes similar steps and looks about the same, whether the user is on a personal computer, a departmental system or a mainframe.

Of all the reasons cited above, the ones that are the most persuasive concern TCP/IP's layers and the fact that it is a public, or nonproprietary, architecture.

The layered approach, a key as-

See **PRO** page 43

MODIFIED FINAL JUDGMENT

ALAN PEARCE

Justice's Rx, with provisos

Recommendations are out from the U.S. Department of Justice about the line-of-business restrictions for Bell operating companies in the Modified Final Judgment. But the AT&T case continues.

The Justice Department recommends BOCs be allowed to offer information services provided the following take place:

- Open Network Architecture and Comparably Efficient Interconnection are available.
- The costs of services are established according to Federal Communications Commission rules.
- Joint ventures are permitted subject to FCC and Justice Department approval.
- There is no joint venturing with AT&T.
- There is no joint venturing among the regional Bell holding companies.

In addition, the BOCs must enter telecommunications equipment manufacturing subject to similar conditions outlined for information services.

BOCs may enter the long-haul business when the following conditions exist:

- State laws permit non-BOC carriers, private users and others to provide all forms of intrastate and interstate transmission and exchange services.
- States do not require non-BOC carriers to offer universal service.
- States offer BOC competitors reasonable access to state-controlled conduits and rights-of-way.
- The BOCs have regulated non-discriminatory tariffs.

The Justice Department further recommends that the BOCs be allowed to offer out-of-territory long-haul services immediately, as well as interexchange cellular radio and other specialized services in all geographic areas. But there is a long way to go before any of these "recommendations" are approved.

Only U.S. District Court Judge Harold Greene will decide if and how the Modified Final Judgment should be changed. He must go through the democratic process, however, before he makes any decision.

Pearce is president of Information Age Economics, a telecommunications research firm in Washington, D.C.

First, he has established a long period for written comment on the recommendations. This will take until the end of April. Second, Greene says he plans to follow the written comments with comprehensive oral arguments in May and June.

Third, Greene will consider his opinion, which may not be available until fall. This stage is critical because it seems likely Greene will want to amend Justice's recommendations.

When he last considered the Modified Final Judgment in 1982, Greene appeared convinced that the BOCs should be kept out of electronic classified advertising, such as electronic Yellow Pages, that might undermine the economics of the U.S. newspaper industry. There is no evidence to demonstrate that he has changed his mind, especially since AT&T was kept out of this particular segment of the industry for seven years.

Fourth, any party that disagrees with Greene's judgment will likely appeal it to the Washington, D.C. Circuit Court. All of this suggests significant delay before the BOCs get any meaningful relief from the Modified Final Judgment.

Finally, the U.S. Congress is an important player in the process. It is clear that Congress wants the BOCs in equipment manufacturing and information services, without necessarily allowing them to compete with national and local newspapers for classified advertising.

Congress doesn't want to undermine the newspaper industry or the First Amendment by permitting giant utilities to dominate the information industry.

Congress' requirements for long-haul services are unclear because there is no consensus, although Congress appears to be reluctant to let the BOCs into the business immediately.

This reluctance is because both MCI Communications Corp. and US Sprint Communications Co., AT&T's two major competitors, are losing money from intense competition.

Although the Justice Department proposals are far-reaching, they should not be taken literally. Time and the policy-making process will amend them, perhaps significantly, and it could take a year or more before the BOCs feel any benefits. ▢


 NETWORK WORLD

Features

March 9, 1987

Job-hopping: stigma vs. strategy

BY JOAN ROULEAU
Special to Network World

Twenty years ago, the career path of a communications manager went something like this: Get a job with AT&T, stay there for 35 years and retire. Today, a telecommunications career is more likely to follow a course like this: Start with AT&T for training, leave for a small start-up company that loses second-round financing, enter a large corporation and get mired in the bureaucracy, and go back to a medium-sized company — all within the first five years.

In another industry, changing jobs this often could be career suicide. But in today's telecommunications industry, with its emphasis on strategic business applications, its rapidly changing regulations and its proliferation of new opportunities, many communications

Rouleau is director of communications for Goldfield Associates, a San Francisco-based communications search firm.

The grass looks greener on the other side.

managers are finding that job-hopping is often a legitimate means of staying ahead of the game.

Changing companies regularly has been gaining acceptance in the communications field since the Carterfone decision in 1968, when a newly deregulated and competitive industry scrambled to find qualified communications personnel. With the demand far outweighing the supply, the traditional stigma of "job-hopper" came under revision.

"In the beginning, the best people were always the job-hoppers," says Tim Lyons, president of Telecommunications Management Associates, Inc. (TAC), a Phoenix-based telecommunications consulting firm. "There was such a demand for good people that it wasn't so much 'job-hopping' as

'body snatching.' Companies were in a bidding war for the best people."

Moreover, the infusion of competition and entrepreneurialism into the industry attracted a more dynamic, aggressive type of job seeker.

"The divestiture created a more exciting industry with more dimensions than the monolithic industry controlled by AT&T," comments Lloyd Isaacs, vice-president of marketing for Williams Telecommunications Co. in Tulsa, Okla., and former president of the International Communications Association. "We've moved away from a stodgy industry to one that has excitement and opportunity in it, and this has created more movement."

The postdivestiture environment also witnessed changes in the roles of communications managers, changes which had a dramatic impact on their careers. As the "telephone industry" evolved into the "communications industry," so too did the communications manag-

 See **Job-hopping** page 32



ILLUSTRATION © '86 PETER PERRY

Job-hopping from page 30

er evolve from someone who calls in adds, moves and changes to someone who integrates voice and data within increasingly sophisticated networks. Thus some communications managers became, in effect, unqualified for the new demands of their old positions, and they were eventually replaced.

Other communications managers saw their careers take off — or stagnate — according to the way executive management perceived the communications function. In some companies, communications remained a cost-control issue, a necessary evil. And so the communications manager was plateaued at a certain level. “Many communications departments aren’t large enough or developed enough to offer a real career path for a communications manager,” says Paul Kirvan, a New Jersey-based communications consultant. “When there’s no room for vertical movement, the only way to substantially increase your salary or level of responsibility is to move laterally to another company.”

Other communications managers have been driven out as companies perceived that their needs had stabilized. One communications manager for a major manufacturing

“Many communications departments aren’t large enough to offer a real career path.”

company described the scenario this way: “A company feels that if good ol’ George can do the telephones, anyone can do the telephones. . . and after a while, the telephones are in such a mess that something drastic has to be done. Then they fire George and hire a high-priced telecommunications manager to make things happen.

“Once all of the pressing changes have been proposed and implemented, somebody says, ‘Look what we’re paying this guy!’ And they get rid of him, and the cycle begins again,” he says.

The managers who are faring best in the postdivestiture environment are those who are able to fuse their technical background with telecommunications business experience. As a growing number of businesses explore the potential of communications technologies as a competitive weapon, those who can apply their technical expertise to strategic business planning are finding they can write their own ticket.

“If you want to get above the \$50,000 mark, you’ve got to be able to translate all this technical information into business terms so that you can sit down with the top brass and discuss how your work affects the business of the compa-

ny,” according to TAC’s Lyons.

Some communications professionals are hesitant to switch jobs because they don’t want to be branded a job-hopper. According to Jane Videtich, manager of corpo-

with you until the next better opportunity comes along. You have to think in terms of the return on your investment.”

On the other hand, some employers find a certain amount of

“When there’s no room for vertical movement, the only way to increase your salary or level of responsibility is to move to another company.”

rate telecommunications operations for R.J. Reynolds Corp., “If you’re looking at a resume with six job changes in 10 years, you have to feel that the person will only be

experience with other companies valuable or even necessary. “A company will look at your reasons for moving around, rather than reject you immediately as a job-hop-

per,” notes Harry Heinz, manager of communications services for Circle K Corp. in Phoenix. “It shows that you’re willing to step out and take risks. In an industry like this, that can speak better for you than if you stay in a stagnant communications function for five years.”

Isaacs of Williams Telecommunications adds, “Those starting out in telecommunications actually need to make a couple of job changes. There are so many aspects to this industry right now, dimensions that weren’t there before,” he says. “The only way you’re really going to get the right perspective and find the right match of your talents with a discipline in the industry is to give a couple of different aspects of the industry a try.” □

Continuity or opportunity?

Is it better to change jobs frequently or to have a long-term career with the same company? Each of the two experienced communications professionals described below is convinced his career strategy has worked for him. Each says his career has provided opportunity for advancement, personal growth, financial reward and job satisfaction.

The frequent job changer

Arnold Hammer is a technical consultant with MCI Communications Corp. in New York. This current position is his sixth in an eight-year communications career.

Hammer says he is excited about the industry because of its dynamics. “I enjoy observing the industry, and I’ve had the opportunity to do so from several different perspectives.” His frequent job changes fulfill a desire “to keep pace with the rapid changes in the industry, gain experience in various parts of the business, and of course, make money.” Hammer, who has worked as a communications analyst and as a manager during his career, says his salary is “significantly more than \$40,000.”

Executive recruiters were often responsible for spurring his moves. “I was helped by headhunters who called me periodically with new opportunities, all of which represented upward moves in terms of my career,” he says. “These changes have given me the chance to learn voice and data communications, PBX systems, and network planning and design. I might not have had those opportunities staying with only one company.”

Another interesting aspect of Hammer’s experiences has been the contacts he made during various jobs. “Many of the people I worked with in one job have been able to help me in later jobs,” he says.

When an individual has had many positions, prospective employers sometimes get nervous about hiring that person because they think he may not remain with the company very long. “I was always honest and up-front with an employer,” Hammer says. “I made sure there would be no problem with my previous job changes before ever going out on interviews.”

According to Hammer, “Most companies I talked with had no problem with my job changes.” He says his record of upward career movement resulted in more professional experience and responsibility for him. He recommends getting “as much education and training as possible, because it can help you many times over in future positions.”

The long-term career

Frank McKeown has been in telecommunications for 17 years with the Fidelity Bank, N.A. in Philadelphia. He is currently the bank’s senior operations officer and says his salary is “in the low \$40,000s.” Although he considers his one-employer career an exception in today’s market, he says he wouldn’t change a thing.

McKeown joined the bank shortly after leaving the Air Force. He didn’t have any particular career focus when he first started working, but over time the bank helped pay for his undergraduate degree, various telecommunications training programs and his participation in major users groups. “These all helped contribute to my career, and I might not have gotten them any other way,” he says.

Today, McKeown says he has no interest in leaving the bank. “The banking industry has been changing so quickly, and competition has gotten so intense, it’s a fun place to be these days.”

When working for the same company, McKeown admits, “The feeling often is that the individ-

ual will not get as much experience with the same firm as with several companies. Fortunately, that has not been my experience.”

McKeown has developed some excellent long-term relationships while at the bank and is on a first-name basis with many of the bank’s senior executives. “I really feel I’m in touch with management, and that’s an important asset in developing new programs and policies for telecommunications,” he says.

According to McKeown, his next goal is to earn a master’s degree, and he is eager to participate in telecommunications training programs that are beginning to appear in Philadelphia.

Advice for professionals

Two telecommunications professionals, one with a long-term career in the same firm and another with many jobs: What do each of them recommend for people planning a career in telecommunications?

Hammer recommends job changes that provide more experience and responsibility. “If the new job doesn’t provide any growth for you, it’s probably not worth making the change,” he says.

According to McKeown, a communications professional who wants to get ahead should go back to school.

“Just make sure to take programs in telecommunications and learn how to operate and use PCs. An advanced degree in business can be helpful, too,” he said.

While there is no real “ideal” length of job, McKeown suggests, “it’s very important for the individual to consider family in the decision process.”

— Paul F. Kirvan

Kirvan is managing director of Paul F. Kirvan & Associates, a communications consulting firm in Turnersville, N.J.



All aboard!

West German railway rolls out advanced SNA net.

■ = IBM mainframe site with 37X5 communications control unit

◆ = 37X5 remote communications control unit site

Continued from page 1

geographic regions, were still being carried out manually.

The Bundesbahn's existing IBM Systems Network Architecture network served the regions through IBM 3705 or 3725 communications processors that supported terminal and remote job entry traffic through cluster controllers. To accommodate expanded public services, such as automated ticket machines, minicomputers would be placed in each of the Bundesbahn's 1,300 remote stations, administration offices, and

McDonald is a founding partner and principal consultant at MGT Technology Group, a capacity management software consulting firm in Waltham, Mass.

maintenance and repair facilities.

All major minicomputer vendors were contacted, and their offerings investigated. After a preselection process, the Bundesbahn decided to install IBM's System/36, Siemens AG's 6680, and Nixdorf Computer Corp.'s 8860 for evaluation. In June 1986, the IBM System/36 was selected.

The Bundesbahn's plan calls for networks of System/36s to be distributed evenly across the country. These networks will operate in conjunction with the existing network and information systems, which are centered in three major data processing centers at Frankfurt, Cologne and Nuremberg. Implementation of the project is scheduled to begin in the first half of 1987.

The networked System/36s will be linked to each other and to the

mainframes by the existing SNA backbone network. Access to the SNA network will allow the System/36 users to communicate with mainframe applications at each of the three main data centers, as well as with applications resident on other local or remote System/36s. Mainframe access enables the System/36 to exchange data files with the host data bases. It also permits the System/36s to send operational alerts to a network management facility in the mainframe, thereby allowing central control of all the separate Advanced Peer-to-Peer Networking (APPN) nets from a single mainframe site.

Three major classes of work will be generated by the System/36s:

■ Application-to-application transfer data. Data is passed between

See All aboard page 34

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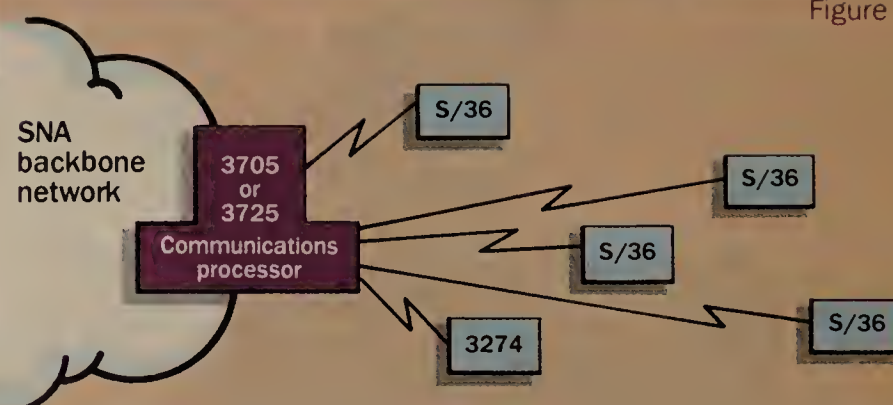


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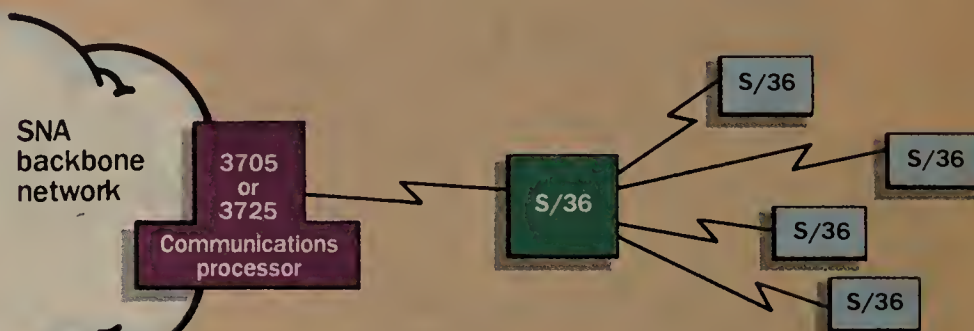
More than just talk.

IBM System/36 networking options

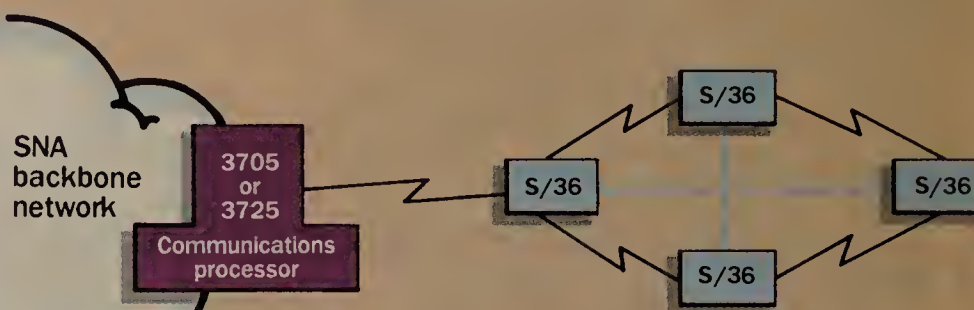
Figure 1



The System/36's point-to-point link is simple to implement, but could lead to line port capacity problems on some 37X5 models.



Using a System/36 as a link concentration point eliminates the port capacity problem, but raises concerns about the capacity of the concentrator System/36, as well as the link between the concentrator and the 37x5.



Linking System/36s via Advanced Peer-to-Peer Networking provides the most functionality, but it is a new and unproven technology.

SOURCE: MGT TECHNOLOGY GROUP, WALTHAM, MASS.

All aboard from page 33

System/36s or between System/36s and mainframe applications. This is an application-to-application transfer and is assisted by IBM's Distributed System Executive (DSX) facility.

■ 3270 pass-through data. The System/36 passes messages between 3270 users and the SNA backbone network as if it were a 3270 control unit. The Pipeline facility allows this operation to take place.

■ Operational management data. The System/36 forwards operational alerts to IBM's Host Command Facility. This facility allows management data from distributed sources to be handled at a centralized operations management application, such as NetView.

The Bundesbahn decided to implement many System/36 network configurations (see Figure 1 on this page), including a combined Advanced Program-to-Program Communications and APPN configuration. APPC allows peer-to-peer communications to be established between intelligent control units such as the System/36 without the users having first to establish a mainframe session. APPN extends this strategy to allow communication with remote nodes.

Networks within a network

The creation of APPN networks that are tied to mainframe processors and to each other by a backbone SNA network is really the

creation of networks within a network.

Care must be exercised to ensure that the APPN networks coexist with one another as well as with the SNA backbone network.

To ensure smooth integration of the new users, the Bundesbahn undertook a capacity planning project that included both host and network capacity planning studies.

The Bundesbahn decided to implement many System/36 network configurations.

This article addresses only the network capacity planning study, which involves building a valid model of the existing SNA network to enable network personnel to answer two key questions prior to actual implementation:

1. What service level will the existing information system — the existing SNA backbone network and host environment — be able to deliver to the new System/36 users?

2. How will the addition of the

Survey of messages
with Frankfurt destination

Table 1

Subarea: Frankfurt network control program
Transmission group connections: To Cologne
To Munich

Message groups*	Message arrivals per hour
Host origin	
Frankfurt host 1	
Application	
Edit small	4,518
Edit large	3,498
IMS	160
Other	2,047
Host origin	
Frankfurt host 2	
Application	
TSO	932
Print	1,311
APL	2,636
Other	470
Host origin	
Cologne host	
Application	
Edit small	1,518
Edit large	492
Other	660

* Message group names have been changed
to protect client confidentiality.

APL = A Programming Language
IMS = Information Management System
TSO = Time-sharing Option

new users affect service levels for
users who are already being ser-
viced by the existing information
systems?

Best1/SNA, an analytic queuing
model from BGS Systems, Inc., a
capacity management provider lo-
cated in Waltham, Mass., was used
in conjunction with the SNA Back-
bone Analyzer, a simulation-based
model, from MGT Technology
Group, also located in Waltham.

"We started to build this net-
work less than two years ago," ob-
serves Klaus Tetzlaff, manager of

SNA at the Bundes-
bahn. "We have
been successful in
putting measure-
ment tools in place,
and we receive reg-
ular performance
reports from IBM's
NPM [Network Per-
formance Monitor].
What we don't cur-
rently have is a total feeling for all
the traffic on a corporate basis."

While the existing SNA opera-
tion had been well-managed since

Input and results of network model

Table 2

Input data for
network model

Results of
network model

Transmission group: 014
Connecting network control programs: Frankfurt to Munich
Transmission group information: Capacity: 19.2K bit/sec
Distance: 600 km
Satellite: No

Message groups	Message arrivals per hour	Destination host	Transmission priority*	Maximum request/ response unit**	Transmission group transit time (in seconds)*** Inbound: 13.6% Outbound: 28.4%
Host origin					
Frankfurt host 1					
Application					
Edit small	912	Frankfurt 1	2	256	.48
Edit large	558	Frankfurt 1	2	256	.87
IMS					
Other	364	Frankfurt 1	2	384	.66
Host origin					
Frankfurt host 2					
Application					
TSO	51	Frankfurt 2	2	1,024	.61
Print	452	Frankfurt 2	1	1,024	1.80
APL					
Other	68	Frankfurt 2	2	256	.58
Host origin					
Cologne host					
Application					
Edit small	102	Cologne	2	256	.47
Edit large	98	Cologne	2	256	.88
Other	105	Cologne	1	512	.68

*This is an IBM Systems Network Architecture data-flow-control parameter that controls priority of
messages dispatched across transmission groups.

**This is an SNA data-flow-control parameter that limits the maximum amount of information that can be
placed in one block of data.

***Transit time includes transmission group queue-wait time, transmission group resequencing time,
clocking time, and link and modem propagation time. Both inbound and outbound times are included in
this total time.

APL = A Programming Language
IMS = Information Management System
TSO = Time-sharing Option

its inception, a formal policy of
performance management and ca-
pacity planning had yet to be im-
plemented. A thorough analysis of
traffic patterns on the network
had not yet been performed, and
the addition of small numbers of
new users was handled by rule of
thumb.

"It's quite easy for me to keep
an eye on local links and transmis-
sion group utilization by monitor-
ing our current measurement data
sources, most notably NPM Netlog
file statistics," Tetzlaff continues.
"When I see utilization approach-
ing a dangerous level, I take appro-
priate action. And if I'm just add-
ing a new cluster, some graphics
terminals or PCs to the network,
that process works fine. But this is
different, and it's not appropriate
to add 1,300 minicomputers by this
method."

The SNA management team at
the Bundesbahn realized in ad-
vance what many IBM users may
find out by trial and catastrophe
— that implementing an APPC/
APPN strategy on top of an SNA
network managed by rule of thumb
is suicidal.

Without sound practices of man-
agement and planning in place for
the existing SNA network, new
functionality promised at the local
APPN level can be severely im-
paired or completely wiped out —
a result of bottlenecks between the
System/36s and the mainframe
computers.

Therefore, the scope of the proj-
ect was redefined to include the es-
tablishment of performance man-
agement and capacity planning

principles in addition to the pro-
duction of a network model.

Network performance manage-
ment and capacity planning have
traditionally been broken down
into three functional areas: mea-
surement and analysis, tuning and
optimization, and planning.

Often the most time-consuming
of these steps is the measurement
process. Fortunately, network
measurement tools were used at
the Bundesbahn since the early

Implementing an
APPC/APPN
strategy on top
of an SNA
network managed
by rule of thumb
is suicidal.

days of the network. IBM's NPM
was producing daily reports on
system component utilization, and
IBM's Response Time Monitor had
recently been installed to produce
end-user response time informa-
tion.

The first step in the analysis
was to profile the different types
of transactions that existed in the
network and to place transactions
with similar characteristics into
message groups. The creation of
See All aboard page 36

Arrival rates as adjusted for new Distributed
Systems Executive message groups

Table 3

Run one:
Same input as Table 2 with additional input of 1,200 Distributed Systems Executive (DSX)*
transactions per hour.

Run two:
Same input as Table 2 with additional input of 3,600 DSX transactions per hour.

Run three:
Same input as Table 2 with additional input of 3,600 DSX transactions per hour
and with additional 9,600 bit/sec link added to the transmission group.

Results
Transit times
(in seconds)

Message groups	Run one	Run two	Run three
Host origin			
Frankfurt host 1			
Application			
Edit small	0.58	1.16	0.68
Edit large	1.06	2.11	1.26
Other	0.78	1.71	0.98
Host origin			
Frankfurt Host 2			
Application			
TSO	0.71	1.55	1.01
Print	2.93	8.09	2.95
Other	0.68	1.31	0.81
Host origin			
Cologne host			
Application			
Edit small	0.58	1.16	0.68
Edit large	1.06	2.20	1.26
Other	1.02	3.81	1.02
Transmission group utility percentage			
Inbound	9.2	21.2	12.6
Outbound	38.8	84.8	51.1

* This is an IBM facility that assists in the distribution of files between distributed
processors and mainframe computers.

TSO = Time-sharing Option

SOURCE: MGT TECHNOLOGY GROUP, WALTHAM, MASS.

All aboard from page 35
message groups allows the capacity planner to predict service levels effectively for groups of users, instead of having to treat each user as an individual entity.

For example, all IBM's Information Management System (IMS) transactions with an inbound message size of between 1 and 50 characters, an outbound message size between 1 and 200 and a CPU time under 1.5 seconds might be grouped together, while other IMS transactions with typically larger inbound or outbound message

these characteristics.

The Bundesbahn's transaction analysis process was conducted by interviewing railway systems personnel familiar with applications that were active over the network and by reviewing NPM VTAM log data, which allows the determination of the number of arrivals by application, message size and host delay times. From this analysis, 11 message groups were formed. Messages were grouped by destination host, application and message size. The groups include Edit (an interactive mainframe edit-

the number of transactions for each particular message group, but the destination subarea of those transactions. A survey table could then be drawn showing which network users access which mainframe applications, how often and over what routes. This is an essential step in establishing a network charge-back system.

The messages from each message group terminate at user terminals attached to the Frankfurt 3725 host (see Table 1 on page 35).

Once the chore of network surveying is complete, the input data sets for the network model are prepared. These data sets consist of information from the survey tables, as well as information on the configuration of the network and the SNA data-flow-control parameters employed by the network software.

A typical input data set (see Table 2 on page 35) will "predict" the performance of a specific transmission group between adjacent 37 by 5 processors. Transmission groups are made up of one or more links that logically function as a single pipeline. The output of this model predicts the utilization of the transmission group and the wait time of messages as they traverse this link.

The existing traffic load on the transmission group is operating well within the user's required transit time of 1.3 seconds for most of the work loads. To determine the total network transit time for a message that traverses many transmission groups between its origin and destination, simply add the transit times for each of the transmission groups it traverses.

The output of the model indicates how close to the danger level the capacity usage is on the transmission group. Changes in message group arrivals, or arrivals from a new message group such as DSX transactions from a System/36, can be projected onto the model.

Arrival rates were adjusted for a new DSX message group (see Table 3 on page 35). In the first run, the transmission group continues to operate in a safe range at 1,200 DSX transactions per hour. But when the arrival rate increases to 3,600 DSX transactions per hour in the second run, utilization approaches a dangerous level and wait times increase greatly. There will be poor performance for DSX users, as well as users making any other transactions that travel across the

transmission group during the time period of these arrival rates.

In the third run, the input data set is adjusted to reflect the addition of a third 9.6K bit/sec link to the transmission group. The results show that a DSX arrival rate of 3,600 arrivals per hour can be adequately supported if the transmission group's bandwidth is increased from an aggregate of 19.2K bit/sec to 28.8K bit/sec. Utilization and transit times of most work loads have returned to reasonable levels, in other words, transit times of less than 1.3 sec.

Modeling scenarios could be played out with various arrival rates for all three message groups coming from the System/36. With appropriate changes to the input data set, the model could also be used to reflect changes in the software data-flow control parameters or the rerouting of transactions.

The whole idea behind capacity planning is to allow the network manager to behave in a proactive rather than a reactive mode. For example, the intent would be to have the third 9.6K bit/sec link actually in place and operational by the time the DSX transaction level is expected to reach the arrival rate indicated. This would keep the problem created on paper from ever materializing.

"What this project gives me," Tetzlaff explains, "is

management and capacity planning is an ongoing function, and the next step in the System/36 implementation program is to apply the strategy at the sub-network level.

An APPN model could predict the interactions at the System/36-to-System/36 level. It could also determine the utilization and wait times within the APPC/APPN network associated with different levels of transaction rates and message characteristics. This would ensure the same level of confidence in maintaining service levels at the subnetwork level and the backbone level, thereby guaranteeing adequate service levels to the user of the information system.

The importance of the Bundesbahn's strategy is demonstrated during a daily train ride from downtown Frankfurt to the international airport. The main railway station in Frankfurt is a central hub, and on Friday afternoon it is often crowded. Automatic ticket-dispensing machines alleviate the crush of customers during peak times. For many trains, however, tickets must still be bought the old-fashioned way, from a clerk at a ticket counter. This is because the Bundesbahn is not yet fully automated. The clerk has a ticket printer and a terminal that is on-line to a minicomputer.

Commuters complain

"This project gives me," Tetzlaff says, "a strategy that allows me to know when the system is being pushed to its capacity, what users in what location are causing the increase and which will be affected."

lengths, or longer CPU times, might be grouped into a second message group. These separate groups are created because messages experience different transit times through the network as a result of such characteristics as message size, host and I/O service, and SNA software flow control parameters. Message groups may be established based on any of

ing program), IMS, IBM's Timesharing Option, a print application and A Programming Language.

Once the message groups were established, the next step was to determine their geographic distribution. This is key to the modeling process, since messages flow over different paths and experience different delays. Further analysis of NPM data revealed not only

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Commuters complain about missed trains as they stand in long lines. An exasperated response is heard from one of the ticket counters. "Ich gehe nur so schnell wie das Automat geht!" (I'm going as fast as the machine will go!)

a strategy that allows me to know when the system is being pushed to its capacity, what users in what location are causing the increase and which users will be affected. It gives me the information I need to establish credibility as head of the SNA group."

The Bundesbahn's network capacity planning project provides a policy for carrying out the addition of new components or new transactions to its network. But performance

about missed trains as they impatiently stand in long lines. Finally, an exasperated response is heard from behind one of the ticket counters. "Ich gehe nur so schnell wie das Automat geht!" (I'm going as fast as the machine will go!)

The new network strategy in place at the Deutsche Bundesbahn will allow the machine to go faster and will reduce the anxiety level of both data processing managers and rush hour commuters. □

Product Focus: PC local-area networks

Which LAN is your LAN?

Arriving at a LAN purchase decision means weighing more than just cost and capacity.

BY JOHN J. HUNTER
Contributing Writer

Many users consider data-carrying capacity and cost per port to be the principal criteria for choosing a local-area network. However, these should not be the deciding factors.

"File sharing is the principal application for LANs," says Subhash Bal, vice-president of marketing for Excelan, Inc. and chairman of the NETBIOS Standards Committee, which is sponsored by Mitre Corp.

To support file sharing for ap-

Hunter is president of TMS Corp., a marketing management consulting firm in Devon, Pa.

plications such as word processing, using an IBM Personal Computer XT or AT as a file server would probably be adequate. But, observes Bal, "for highly interactive applications, as when many users are constantly interacting with large data bases and transferring large files, DOS-based personal computer servers get bogged down."

The reason? MS-DOS is unable to handle multiuser, multitasking applications. This might change when Microsoft Corp. introduces MS-DOS 5.1, since it is speculated that the new operating system will offer multitasking along with the file, record and byte locking now available with MS-DOS 3.1.

In addition, once Intel Corp.'s

32-bit 80386 microprocessor is widely used, MS-DOS 5.1 might be able to support cache memory to further speed data retrieval.

If a user cannot wait for MS-DOS 5.1, he can use a Personal Computer XT or AT to handle multiuser, multitasking environments by employing software such as Novell, Inc.'s NetWare and 3Com Corp.'s 3+.

Both of these systems increase performance by moving disk directories to random-access memory and by employing memory-caching techniques that hold frequently used files in RAM. While both of these techniques speed file access, disks used with personal computers are still slow to retrieve data.

See LAN page 39

Product focus: baseband local-area networks

Vendor	Model	Backbone speed (bit/sec)	Backbone medium	Devices supported per CSU	Stations supported per segment	Maximum number of stations supported	Maximum packet size (bytes)	Access method	Buffered repeater/ filter bridge	Priority messaging	Resource logical addressing	Multicast addressing	Protocols	Gateways	Servers	Lowest cost per port
Apple Computer, Inc. Cupertino, Calif.	AppleTalk	230.4K	Shielded twisted-pair	1	NA	32	605	CSMA/CA	NA		✓				File, printer	\$75 (For Macintosh)
Applied Knowledge Groups, Inc. Sunnyvale, Calif.	Knowledge Network	115K	Twisted-pair	1	NA	6	512	CSMA/CD	NA		✓		Proprietary			\$150 (Ethernet port)
Applitek Corp. Wakefield, Mass.	EI 10	10M	Coaxial	10	100	1,024	1,526	CSMA/CD	✓	✓	✓	✓	Proprietary	X.25		\$325
Artel Communications Corp. Worcester, Mass.	FiberWay	100M	Fiber-optic cable	8	NA	1,200	1,534	Token passing	NA	NA	NA	NA	NA			\$150
AST Research, Inc. Irvine, Calif.	AST-Star System	1M	Twisted-pair	1	100	1,000	NA	CSMA/CD	NA	NA	✓	✓	IBM Personal Computer	SNA, IBM 5250, 3270	File	\$395
AT&T Information Systems, Inc. Morristown, N.J.	Starian	1M	Twisted-pair	1	NA	1,210	1,526	CSMA/CD	✓		✓	✓		SNA, ISN	File, printer	\$720
Bridge Communications, Inc. Mountain View, Calif.	Ethernet	10M	Coaxial, twisted-pair, fiber-optic	64	100	1,024	1,526	CSMA/CD	✓		✓	✓	TCP/IP, XNS	X.25, SNA, Token-Ring, Unibus	Communications	\$250
	CS-200	10M	Coaxial, twisted-pair, fiber-optic	10	100	1,024	1,526	CSMA/CD	✓		✓	✓	TCP/IP, XNS	X.25, SNA, Token-Ring, Unibus	Communications	\$280
Codenoll Technology Corp. Yonkers, N.Y.	Codenet	10M	Fiber-optic	32	NA	1,024	1,526	CSMA/CD	✓	✓			TCP/IP			\$1,300
Codex Corp. Mansfield, Mass.	Asynchronous LAN	10M	Coaxial, thin coaxial	32	100	4,000	1,526	CSMA/CA/CD			✓		XNS	SNA, X.25		\$250
ComDesign, Inc. Goleta, Calif.	FutureCom	10M	Coaxial, twisted-pair	32	100	1,024	1,526	CSMA/CD		✓	✓	✓	Proprietary	Asynchronous	Communications	\$230
Communication Machinery Corp. Santa Barbara, Calif.	ENP	10M	Coaxial	32	100	1,024	1,518	CSMA/CD	✓	✓	✓	✓	TCP/IP, XNS	DDN	Terminal	\$895 for personal computer; \$311 for others

Vendor	Model	Backbone speed (bit/sec)	Backbone medium	Devices supported per CSU	Stations supported per segment	Maximum number of stations supported	Maximum packet size (bytes)	Access method	Buffered repeater/ filter bridge	Priority messaging	Resource logical addressing	Multicast addressing	Protocols	Gateways	Servers	Lowest cost per port
Contel Business Networks Bethesda, Md.	Series 3000	10M	Coaxial, twisted-pair, fiber-optic	64	100	1,600	1,526	CSMA/CD	✓		✓	✓	TCP/IP, XNS	X.25, Ethernet, SNA	File, printer	\$595 for personal computer; \$325 for asynchronous
Corvus Systems, Inc. San Jose, Calif.	Omninet	1M	Twisted-pair	1	NA	64	2K	CSMA/CA		✓	✓		TCP/IP	X.25, SNA, Ethernet	File, printer	\$400
Datapoint Corp. San Antonio, Texas	ARCnet	2.5M	Coaxial, IBM, fiber-optic	24	NA	6,120	256	Token-Ring			✓		TCP/IP	X.25, SNA, X.21, asynchronous, Burroughs, Sperry UTS, Multibus	File, printer, communications	\$2,000
David Systems, Inc. Sunnyvale, Calif.	David Network Manager	10M	Twisted-pair	1	NA	3,000 Ethernet; 6,000 RS-232	1,526	CSMA/CD			✓		TCP/IP, XNS, MAP	X.25	Communications, T-1 wide-area networks	\$695
Excelan, Inc. San Jose, Calif.	Exos200	10M	Coaxial	32	100	1,024	1,526	CSMA/CD	✓	✓	✓	✓	TCP/IP	PC bus, Unibus, Q-bus, Multibus		\$795 for personal computer
Fast Feedback Technologies, Inc. Redondo Beach, Calif.	Microlan	3M	Coaxial, twisted-pair, fiber-optic	1	NA	253	64K	CSMA/CA/CD			✓	✓	Proprietary	Token-Ring, ARCnet, Ethernet		\$225
Fibronics International, Inc. Hyannis, Mass.	FINEX (FDDI)	100M	Fiber-optic	4	NA	1,000	7,500	Token-Ring	✓	✓	✓	✓	TCP/IP	Ethernet, 802.5		\$5,000
Fortune Systems Corp. Belmont, Calif.	Fortune: Link	2.5M	Coaxial	1	NA	255	512	Token passing	NA		✓	✓	XNS	X.25, 3270 (BSC/SDLC), asynchronous, IBM 3780	File, printer, communications	\$795
Fox Research, Inc. Dayton, Ohio	10-NET	1M	Twisted-pair	1	32	512	1,526	CSMA/CA	✓	✓	✓			SNA, asynchronous	File, printer	\$1,400
Gateway Communications, Inc. Irvine, Calif.	G/NET	1.4M	Coaxial	1	NA	255	2,550	CSMA/CA/CD	✓		✓	✓	Proprietary	X.25, SNA, asynchronous	File, communications	\$950
IBM White Plains, N.Y.	Token-Ring Network	4M	Twisted-pair, IBM, fiber-optic	1	NA	260; 72 with twisted-pair	2K	Token-Ring	✓	✓	✓	✓	Proprietary	SNA, PC Net, asynchronous, LU 6.2	Printer	\$695
Micom-Interlan, Inc. Boxborough, Mass.	Ethernet	1M or 10M	Coaxial, thin coaxial	8	100	1,024	1,526	CSMA/CD	✓		✓	✓	TCP/IP, XNS	Starlan	Terminal, file, printer	\$395
Nestar Systems, Inc. Palo Alto, Calif.	Plan 3000	2.5M	Coaxial, IBM, twisted-pair, fiber-optic	16	NA	255	512	Token bus			✓	✓	XNS, IBM PC	SNA, 3270, asynchronous, PC Net	File, printer, communications	\$595
	Token Ring	4M	IBM	1	NA	260	512	Token-Ring	✓	✓	✓	✓	IBM PC	SNA, asynchronous, 3270, PC Net	File, printer, communications	\$695
Network Systems, Corp. Minneapolis, Minn.	Hyperbus	10M	Coaxial	8	NA	3,200	4K	CSMA/CA		✓	✓		TCP/IP		Terminal	\$270
	Hyperchannel	10M or 50M	Coaxial	5	NA	50	4K	CSMA/CD			✓		TCP/IP		Terminal	\$1,700 for personal computer; \$20,000 for IBM Selector Channel
Novell, Inc. Orem, Utah	S/Net	10M	Twisted-pair	24	NA	1,536	512	Pollid terminal			✓	✓	Proprietary	SNA, 3270, asynchronous	File, communications	\$250
Orchid Technology, Inc. Fremont, Calif.	PCnet	1M	Coaxial	1	NA	255	1,536	CSMA/CD		✓	✓	✓	IBM PC	SNA, 3270	File, RS-232 asynchronous	\$1,090
Proteon, Inc. Westborough, Mass.	ProNET-4	4M	Twisted-pair, IBM, fiber-optic	1	NA	260	2K	Token-Ring		✓	✓	✓	TCP/IP, XNS	Ethernet, DDN, DECnet, synchronous, SNA, 3270	File, printer	\$695
	ProNET-10	10M	IBM, fiber-optic, infrared, microwave	1	NA	255	2K	Token-Ring				✓	TCP/IP, XNS	Ethernet, DDN, DECnet, synchronous, SNA, 3270	File, printer	\$799
	ProNET-80	80M	IBM, fiber-optic	1	NA	255	4K	Token-Ring				✓	TCP/IP, XNS	Ethernet, DDN, DECnet, synchronous, SNA, 3270	File, printer	\$4,900
3Com Corp. Mountain View, Calif.	Ethernet	10M	Coaxial	1	100	1,024	1,526	CSMA/CD	✓		✓	✓	XNS	Token-Ring, AppleTalk	File, printer	\$815
	Token Ring	4M	Twisted-pair, IBM	1	NA	260	2K	Token-Ring	✓		✓	✓	XNS	Ethernet, AppleTalk	File, printer	\$1,218
Tiara Computer Systems, Inc. Mountain View, Calif.	TiaraLink	2.5M	Coaxial	1	NA	255	508	Token bus			✓		XNS		File	\$655
TRW, Inc. Information Networks Division Torrance, Calif.	ACU	10M	Coaxial	32	100	1,024	1,526	CSMA/CD	✓		✓	✓	TCP/IP, XNS	X.25, SNA, Token-Ring, Unibus	Communications	\$275
Ungermann-Bass, Inc. Sente Clare, Calif.	Ethernet	10M	Coaxial	24	2,400	24,000	1,526	CSMA/CD	✓		✓	✓	TCP/IP	X.25, SNA, X.21, asynchronous, Burroughs	File, printer, communications	\$325
	Thin Coax	10M	Thin coaxial	24	30	16,000	1,526	CSMA/CD	✓		✓	✓	TCP/IP	X.25	File, printer	\$595
	Fiber Optic	10M	Fiber-optic	24	2,400	24,000	1,526	CSMA/CD	✓		✓	✓	TCP/IP	X.25	File, printer	\$595
	Token Ring	4M	IBM	8	NA	260	600	Token-Ring	✓	✓	✓	✓	TCP/IP	X.25	File, printer	\$385
Univation, Inc. Milptas, Calif.	LANscape	10M	Coaxial or fiber-optic	1	100	1,024	1,526	CSMA/CD	✓	✓	✓	✓	TCP/IP	SNA, ARCnet, PC Net, Token-Ring, Omnet		\$1,250
Wang Laboratories, Inc. Lowell, Mass.	Local Interconnect	2.5M	Coaxial	24	NA	255	512	Token bus		✓	✓		Proprietary	X.25	File, printer, communications	\$500
Xerox Corp. Stamford, Conn.	Ethernet	10M	Twisted-pair, fiber-optic, coaxial	8	100	1,024	1,526	CSMA/CD			✓	✓	XNS	X.25	File, printer, communications	\$500

LAN from page 37

"There are ways around that," says Don Gilmore, operating system project manager for Novell. "We decided to speed disk access by employing directory hashing and elevator seeking; and so far, we're happy with the results."

With directory hashing, the file-server control program monitors the most frequently used disk addresses and maps them to a subdirectory that is held in RAM. That directory is used in place of the main disk directories to handle file-access requests.

Elevator seeking monitors the pending file-access requests in relation to the disk head position and directs the head to the nearest track that will satisfy a request.

Systems such as the recently announced Corvus Systems, Inc. PC/NOS network operating system relieve bottlenecks associated with using a single personal computer as a file server. The PC/NOS does this by spreading a data base to other networked personal computers.

PC/NOS is distributed to each personal computer that provides server functions, and it permits the disk drives, printers and modems to be accessed by all other workstations. The system is compatible with MS-DOS 3.1 and employs that operating system's file- and record-locking facilities. It's unclear how fast PC/NOS will be, however,

Systems, Inc., or users can buy them directly from their local-area network vendor.

Using a single vendor for all products eliminates the finger pointing that results when problems occur in multivendor environments. However, third-party vendors may offer superior performance and lower prices.

When evaluating a file server, pay particular attention to the number of disks supported, the disk seek and latency times, and the data transfer rate, since they all affect system performance. Also, check the vendor's data base management software to see how efficiently files are organized on disk and whether performance boosters such as memory caching and RAM-resident directories are used.

For example, Banyan's Virtual Networking Systems (VINES) employ combination file servers and communications servers. The VINES product line comprises the VINES/286 for the IBM Personal Computer AT as well as the stand-alone Banyan/DTS and Banyan/BNS systems.

These systems support up to 12, 20 and 60 users, with up to 160M bytes, 240M bytes and 480M bytes of disk storage, respectively.

The weakness of the VINES systems is their available disk storage, which looks thin, given the number of users that can be sup-

portations protocol is also vital [in selecting a local net]. Many people are on the fence waiting for OSI [Open Systems Interconnect] to be fully defined, and it could be some time in coming.

"Therefore, they should choose a protocol that is now well-defined, has proven reliable and is available on most systems of interest. A de facto standard that is available today is [Transmission Control Protocol/Internet Protocol]."

Excelan is not alone in its thinking. More than 75% of the personal computer local network vendors listed in the accompanying charts support TCP/IP, which was developed by the U.S. Department of Defense in the mid-1970s.

Although the term TCP/IP applies specifically to protocols comparable to OSI Layers 3 and 4, it is often used to refer to a larger suite of Defense Department protocols, which includes Simple Mail Transfer Protocol and Telnet File Transfer Protocol.

While TCP/IP is gaining popularity in the private sector, the Department of Defense has stated its intention to migrate its systems away from TCP/IP and to OSI protocols as they become available.

Several personal computer local network vendors also support Xerox Network System, a protocol suite developed and licensed by Xerox Corp. XNS is used extensive-

Baseband chart terminology:
Buffered repeater/filter bridge allows segmented local networks to be extended beyond their predefined limits by establishing a bridge or filter that monitors backbone traffic and selects packets addressed to other portions of the network.

Priority messaging enables some terminals to gain access to the network ahead of others.

Resource logical addressing permits system resources (such as file servers) to be assigned a name, as opposed to a network address.

Multicast addressing lets users group specific stations under a designated name when sending messages.

Broadband chart terminology:

Single-cable maximum channels for transmitting and receiving/speed refers to the maximum number of channels available for transmitting and receiving as well as the maximum data rate per channel. This applies to local networks configured to use the same cable for transmitting and receiving data.

Dual-cable maximum channels for transmitting and receiving/speed displays the same data for local nets that use separate cables for transmitting and receiving data.

Product focus: broadband local-area networks

Vendor	Model	Terminal interface	Maximum ports per terminal interface unit	Single cable maximum channels for transmitting and receiving/speed (bit/sec)	Dual cable maximum channels for transmitting and receiving/speed (bit/sec)	Data protocol	Local-area network access protocol	Gateways	Lowest cost per port
Agile Systems, Inc. Carrollton, Texas	AN 20 Series	RS-232	32	60,60/128K	60,60/128K	Asynchronous	CSMA/CD/CA		\$150
Allen-Bradley Co. Ann Arbor, Mich.	Vistalan/PC	IBM PC Bus	1	5,5/2.5M	5,5/2.5M	PC	Token bus	SNA, asynchronous, Vistalan/1	\$650
Applitek Corp. Wakefield, Mass.	UniLAN	RS-232, RS-449	32	26,26/10M	59,59/10M	Asynchronous, BSC, SDLC	CSMA/CD, Token bus	X.25, SNA, Burroughs, Sperry UTS, Multibus	\$490
Bridge Communications, Inc. Mountain View, Calif.	CS/1	RS-232, RS-422, IBM 3270 coaxial	64	5,5/5M	5,5/5M	Asynchronous, BSC, IBM 3270	CSMA/CD	Ethernet, X.25, SNA	\$250
	CS/200	RS-232	10	5,5/5M	5,5/5M	Asynchronous, BSC	CSMA/CD	Ethernet, X.25, SNA	\$360
Concord Communications, Inc. Marlboro, Mass.	Token/Net	RS-232, RS-422, RS-449	12	3,3/10M		Asynchronous, HDLC	Token bus		\$500
Sytek, Inc. Mountain View, Calif.	System 2000	RS-232	32	60,60/128K		Asynchronous	CSMA/CD		\$726
	System 3000	IBM 3270	16	60,60/128K		IBM 3270	CSMA/CD		\$1,000
	System 6000	IBM PC	1	1,1/2M		NETBIOS	CSMA/CD	SNA	\$530
Ungermann-Bass, Inc. Santa Clara, Calif.	Net/One	RS-232, RS-449, CCITT V.35	24	5,5/5M		Asynchronous, BSC, SDLC	CSMA/CD	X.25	\$400
Zenith Data Systems Glenview, Ill.	Z-LAN	RS-232	16	4,4/500K	4,4/500K	Asynchronous, synchronous, IBM 3270	CSMA/CD	X.25, SNA	\$200

BSC = Binary Synchronous Communications
CA = Collision avoidance
CSMA/CD = Carrier-sense multiple access with collision detection

HDLC = High-Level Data Link Control
NETBIOS = Network Basic I/O System
SDLC = Synchronous Data Link Control

SNA = Systems Network Architecture
UTS = Universal Terminal System

SOURCE: TMS CORP., DEVON, PA.

since requests for servers will have to be directed by the control program to the appropriate personal computer.

Stand-alone servers

For users who require more disk capacity than a personal computer can provide, stand-alone file servers are the only game in town. These multiuser, multitasking units employ memory-caching and fast disks, and they have good data access security features. MS-DOS currently has only rudimentary password security.

File servers are available from companies such as 3Com, Novell, Nestar Systems, Inc. and Banyan

ported. Banyan concedes this and recommends that fewer users be placed on systems with large files or where a lot of file accessing is done.

When evaluating local-area networks and file servers, users should also evaluate the data base management software that will run on them. At a minimum, a DBMS should be able to provide file password security. Better still are passwords located at the record level. Network managers should be able to restrict selectively the operations each user can perform.

Aside from efficient file sharing, Excelan's Bal says, "the communi-

ly in local nets employed for office automation and product development.

A third group of local network communications protocols comprises IBM's Network Basic I/O System and Advanced Program-to-Program Communications, which provide functionality similar to TCP/IP and XNS but were developed for token-ring local-area networks.

The reason more personal computer local network vendors are leaning toward TCP/IP is that it is a better defined architecture, especially with regard to internetworking. And, it corresponds roughly to the International Standards Orga-

Lowest cost per port data is based on the vendor's largest port configuration and may not be accurate for smaller configurations.

nization's (ISO) OSI model, which may ultimately become the worldwide interconnect protocol.

XNS and TCP/IP are comparable to the OSI model through Layer 4. However, at Layer 5 (the session layer), XNS has a courier function for session establishment, while TCP/IP has no corresponding facility.

XNS is not defined at Layers 6
See LAN page 42



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and 7 (the presentation and application layers). TCP/IP's Telnet File Transfer protocol, however, corresponds roughly to OSI Layers 6 and 7, and allows data transfer to dissimilar products or operating systems.

One of the major differences between XNS and TCP/IP is that the latter supports well-defined applications such as file transfer, log on and electronic mail that are implemented at OSI Layers 6 and 7.

In addition, use of IBM's NETBIOS as a standard network application interface on top of TCP/IP at Layers 5, 6 and 7 has made more applications available.

The TCP/IP vs. XNS issue is still open to debate. Some industry ana-

lysts claim that TCP/IP is a "resource hog" and is too slow in execution. Others agree that TCP/IP does use more code and takes about 10% longer to run, but they

Some industry analysts claim that TCP/IP is a "resource hog" and is too slow in execution.

contend that the connectivity it provides between diverse systems makes it worthwhile.

While TCP/IP is currently implemented on a number of local networks, file transfer still requires

users to know file locations. That situation will be remedied once OSI is fully defined.

"The OSI protocol suite goes a long way to make file transfers be-

tween dissimilar products easier by making the transfer operation transparent to the user," Bal says. "Operators will be able to continue employing the same operating system commands, and they will not have to know which machine the file resides on and the name of the file, as is now the case."

In addition, the ISO file transfer and access management (FTAM) will permit portions of the files to be transmitted, instead of entire files as with TCP/IP. However, FTAM is not yet commercially available.

Gateways

Two additional factors to consider when choosing a local net are connectivity between networks or from local networks to host computers, and the ability to link local-area networks to wide-area networks via data transmission facilities such as terrestrial telephone lines, microwave and satellites.

Transmission delays should be expected when using wide-area communications servers since the local net may transmit at up to 10M bit/sec, and most wide-area transport media are considerably slower. With Ethernet local networks, a propagation delay of 9.6 microseconds is associated with moving a data packet from one end of the cable to the other.

How are long delays such as those of satellites compensated for? According to Paul Schaller, vice-president of sales and marketing at Vitalink Communications Corp., a maker of Ethernet local network communications products, the delays associated with satellite transmission have no real effect since the Ethernet protocol will regenerate packets lost during a time-out. However, some user applications will not tolerate delays.

What about broadband?

While baseband local-area networks have received most of the attention, broadband local networks have faded. However, unlike baseband, broadband units can easily handle multiple high-speed applications simultaneously.

Broadband local nets are analog systems that modulate data to radio frequencies and use frequency-division multiplexing to split available bandwidth into multiple channels over coaxial cable. By contrast, baseband local nets dedicate the entire bandwidth to one application at a time.

One drawback to using broadband is that the lack of standards governing the frequencies assigned

to applications can result in transmission problems if frequencies should overlap.

For users with frequency-agile modems, such overlaps are only temporary inconveniences that are easily resolved by changing the modem transmit/receive frequencies.

However, fixed-frequency units must be recalibrated, which usually means sending them to the manufacturer. Users planning to purchase modems and frequency translators from third-party vendors should be sure the frequencies assigned are compatible with their applications.

The radio frequency (RF) modem is the source of another problem — adjacent channel noise caused by harmonic distortions. Poorly designed RF modem filters cause bleeding between channels.

To avoid this, choose a modem with a noise level that is from 30 to 50 db below the signal being transmitted.

Media trade-offs

While broadband systems use coaxial cable, baseband may use fiber-optic, coaxial or twisted-pair wiring. Of these, fiber-optic-based local networks offer the highest data carrying capacity, about

Broadband units can easily handle multiple high-speed applications simultaneously.

100M bits. However, the cost is high for connectors, photodiodes and lasers that are used to modulate transmissions and splice the cable to add workstations.

Twisted pair is the least expensive medium and has a 1M to 4M bit/sec transmission rate. In addition, Xerox supports Ethernet over shielded twisted pair at 10M bit/sec, and the company is about to announce Ethernet over unshielded twisted pairs at the same speed.

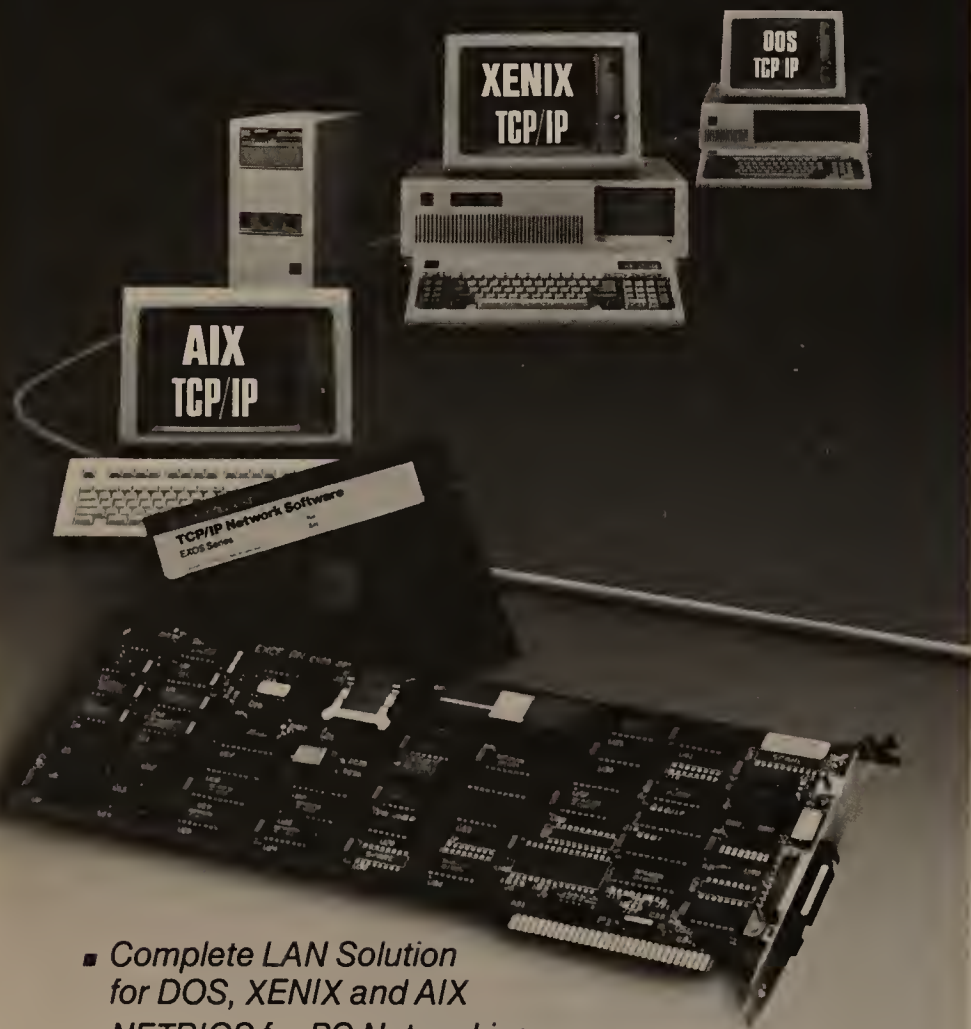
This scheme, however, is only for wire running between the workstation and the backbone, or it is used to wire the wire closet for star configurations.

The Xerox product makes AT&T's Starlan, which supports Ethernet over unshielded twisted pair at 1M bit/sec, less attractive. In response, AT&T is working on a new wiring scheme. While twisted pair is a suitable backbone for some local networks, it has a limited ability to carry higher speed data without an unacceptably high incidence of errors.

Network managers considering implementing a local-area network must evaluate and prioritize an ever-widening array of options. Users should evaluate a local net on the basis of its ability to meet the demands of the job mix. **□**

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► STRATEGIC APPLICATIONS

J.C. Penney bets on home shopping

\$40m cable TV, phone system links viewers to mall of vendors.

BY BOB HAMEL
Senior Editor

SCHAUMBERG, Ill. — The J.C. Penney Co., Inc. is making a strategic push into the nascent home shopping market with the investment of \$40 million in a service that will let people browse through television-displayed “catalogs” using their push-button telephones.

J.C. Penney subsidiary Telaction Corp. will test market the home shopping service this summer to 125,000 users in the Chicago area. If successful, the company plans to expand the Telaction service to 20 major cities by the end of 1989 and 60 cities over the next five years.

The \$40 million investment will cover costs involved with developing the Telaction technology and introducing it to the market, the company reported.

Telaction’s list of participating retailers and service companies already includes Abercrombie & Fitch Co., American Airlines, Inc., American Express Co., Marshall Field & Co., Nash-Finch Co. (a wholesale grocers company), Spiegel, Inc., the Ticketron ticket agency, and Telaction’s parent, J.C. Penney. Telaction’s president, Stuart MacIntire, said the company is negotiating with an additional 45 potential participants.

According to Duncan Muir, a spokesman for J.C. Penney, the company has been investigating in-home shopping services for a number of years. The phenomenal success of the Home Shopping Network — a television show used to display products viewers can order by telephone — encouraged the company to put its plans into

action.

Telaction was formed in January 1986 to develop and market a home shopping service based on technology supplied by Cableshare, Inc., a London, Ont., company 36% owned by J.C. Penney.

Muir said the major difference between Telaction and Home Shopping Network’s systems is the two-way nature of Telaction’s service.

The phemonenal success of Home Shopping Network encouraged the firm to act.

“Theirs is essentially a passive system in that the consumer just watches what is shown on television,” he said. “With the Home Shopping Network, the consumer has no control over what’s on the tube. With Telaction, the consumers make the decisions about what products or services they want to see and buy,” Muir added.

To access Telaction, users switch their televisions to the Telaction cable channel and dial the company’s toll-free 800 number with a push-button telephone. Calls are routed to Telaction’s Tandem Computer, Inc. Nonstop VLX system located here. After the user enters a personal identification number, the system displays a

menu on the user’s television screen, listing the companies and services available. With the telephone keypad, the user can choose where he wants to shop by selecting a store listing, such as Spiegel’s, or general product categories, such as clothing, or by searching for items on sale.

Once the category or store is selected, the Tandem computer processes the keypad responses and directs an attached audiovisual display system to send the requested audio and video presentations through the local cable line to the user’s television.

While watching the selection, viewers can interactively request information about what they are seeing. In a clothing category, for example, the viewer can ask about the color, size, style, options or price of an item by keying in the appropriate responses. If he wants the item, he purchases it by selecting a credit card payment method. His personal credit card information is already stored in the Tandem data base. Participating vendors access the Tandem data base daily to retrieve order information.

The Telaction system enables retailers to change their video presentations and update prices as necessary. The system also displays special features, such as fashion shows, consumer reports, and restaurant and theater guides.

Telaction will charge participating companies based on the number of products the company is offering and purchase volumes.

Telaction will be a free cable service to users, bundled into a local cable company’s basic service package. MacIntire believes the service will add value to local cable services by attracting new cable subscribers and aiding subscriber retention.

Kathleen Kanehann, a spokeswoman for Telaction Corp., said she sees the shopping system as having two benefits to the consumer. “It’s useful as a way to buy and as a way to browse. It’s a way of offering consumers more detail about a product before they buy.”

She also said the shopping system complements other forms of retailing such as catalogs and shopping malls. “It certainly won’t replace the catalog or shopping mall, but it does provide the retailer with another valuable mechanism to get its product before the consumer,” she said. Kanehann added that, if successful, Telaction will be expanded to other service areas, such as real estate and automobile manufacturers. □

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pect of OSI, is what was used in the development of TCP/IP. It permits defining the standard mainly in terms of layer-to-layer interfaces, with the networking activities defined within each layer.

In the individual layers, different vendors can efficiently perform networking tasks for their own special hardware and software capabilities. In addition, they can implement proprietary enhancements for single-vendor net-

works.

The era of the closed shop — all one brand of hardware and one operating system — is ebbing, if it is not completely gone. Users must have networking that ignores brands and operating systems, and can go from one to another without fuss.

It may be true that OSI will do this someday. But TCP/IP does it today, and this architecture can ease users into the arrival of a future with OSI. □

CON from page 29

X.25, an official network layer for OSI, is a mature and widely available protocol. It’s being used today to connect virtually every computer manufacturer’s architecture to every other.

Unfortunately, the only standard application running on X.25 today is terminal PAD — X.23, X.28, X.29 Packet Assembly/Disassembly — which provides a primitive virtual terminal capability. As a migration path, X.25 is superior to TCP/IP due to its current accep-

tance in the OSI protocol suite.

TCP/IP not best migration path

TCP/IP is not the best migration path to OSI because it is incompatible with OSI and because true OSI products have been available since 1986 in the form of MAP products.

This year will see the introduction of further OSI support by most computer manufacturers, including such application products as FTAM and X.400. Why buy an approximation when you can get the real thing? □



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NW

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phone is replacing its analog central office switches with digital switches such as AT&T's 5ESS and Northern Telecom, Inc.'s DMS 100. Brinkert said the company has already upgraded 66% of its central offices.

Brinkert has bullish projections for the future of digital Centrex in light of its success to date. "In 1986, we sold more Centrex accounts than ever before in one year. I expect that success to continue," he said.

But the bulk of New England Telephone's new digital Centrex accounts have been Nova Centrex users, which generate less revenue than larger users. Intellipath is, therefore, a critical component in New England Telephone's profitability in Centrex services.

"Intellipath, in particular, will be the bread and butter of our future," Brinkert said.

From 1982 to 1985, New England Telephone suffered flat growth in the 500-line-and-above market as large customers moved to PBX solutions. "We lost some significant customers because the feature mix available on the old analog Centrex did not compete with digital PBX capabilities," Brinkert said. "But now we have turned the corner and are stabilizing our base."

If indeed New England Telephone has turned the corner, it

may be largely due to improved service offerings and more competitive pricing.

New England Telephone now has a facilities-based pricing option for the 500-line-and-above customer. Facilities-based pricing enables the Bell operating company to tailor services to meet customers needs and to charge on a contractual basis, compared to the old method of having a set price per Centrex line.

New England Telephone is currently bidding on some 60,000 to 80,000 lines for digital Centrex service, and Brinkert said he thinks the data services made available by Intellipath have attracted the attention of a new pool of users.

"Two years ago, a lot of customers with sophisticated requirements wouldn't consider Centrex," he said. "That has changed drastically. We are able to meet those requirements with competitive pricing because of Intellipath."

The lure of Integrated Services Digital Network capabilities will largely sustain the accelerated 20% growth pattern New England Telephone is betting on, according to Brinkert. "We provide a bridge to ISDN," he said, adding that the BOC is now bidding on several large ISDN contracts in Boston.

The BOC will also file within the next two weeks to offer a packet network service called Infopath, now in beta test. □

MCI from page 1

give MCI and others more breathing room and enable long-haul carriers to reestablish more striking price differences between their rates and those of AT&T.

The price competition resulted in MCI's reporting a loss of \$448 million in 1986, a financial picture that prompted MCI officials to reconsider their strategy.

MCI President and Chief Operating Officer Bert C. Roberts said at a press conference here last week that the FCC has botched deregulation of the interexchange market, and it is time it got out of the business of regulating long-distance services altogether. Roberts criticized FCC Chairman Mark Fowler for what he called a failure to fully grasp the dynamics of the telecommunications industry.

"Despite the FCC's mismanagement of the transition to a competitive industry, a number of interexchange carriers are providing more services to more customers than ever before," Roberts said.

In a press conference Friday, AT&T outlined its filing, which also recommended abolition of rate-of-return regulations and called for the FCC to streamline its tariff approval procedures. But Lawrence Garfinkel, AT&T vice-president of marketing services, said the company's long-distance prices would not increase in the absence of rate-of-return regulations because AT&T would not risk losing market share to competitors. In place of these regulations, AT&T promoted establishment of rate ceilings for core services.

As part of its streamlining plan,

AT&T asked the FCC to cut the time needed for tariff approval from about 45 days to 14.

Details on US Sprint's filing were not available by press time.

The International Communications Association (ICA) disagreed with MCI on total deregulation of AT&T. "What users want are cost-based prices, and that is what we've been seeing lately. Users are pleased with the recent decline in long-distance rates and see no reason to alter this trend," said ICA attorney Brian Moir.

MCI's Roberts called on the FCC to "redirect its resources to regulating the true monopolies in this industry: the local telephone companies. The FCC has its priorities backward, devoting substantial resources to micro-managing the long-distance industry, while advocating that the monopolistic providers of local telephone service be unleashed into other industry segments."

U.S. District Judge Harold Greene is considering a Department of Justice recommendation to allow the BOCs into the long-distance, information services and equipment manufacturing businesses. If adopted, companies such as MCI would not only have to worry about competing with industry Goliath AT&T, but with seven additional monoliths.

The advent of new leadership at the FCC is another reason behind MCI's recommendations. Roberts said he hoped incoming Chairman Dennis Patrick will better understand the principles at work in the telecommunications industry and the pressures businesses face. □

IBM from page 1

layer, or Layer 7, of the International Standards Organization's Open Systems Interconnect (OSI) network model.

When used in conjunction with enhanced versions of other IBM software packages released at the show, the products span all seven layers of the OSI model, the company said.

In particular, the new and enhanced products enable IBM to support the X.400 messaging standard and provide a connection between OSI and IBM's Distributed Office Support System (DISOSS).

This is achieved with IBM's new X.400 Message Transfer Facility Program Offering, which uses OSI protocols to exchange messages with X.400-compatible messaging systems, and the IBM X.400 DISOSS Connection Program Offering, used to transform and relay messages between DISOSS and the former program.

IBM also issued Release 2 of its Open Systems Transport and Session Service (OTSS), which adds X.400 support to the earlier release of that product. And the company announced a second release of Open Systems Network Support (OSNS), which provides the ability to connect programs in an IBM host to other IBM or non-IBM systems via X.25 packet networks.

Both software products can be used in IBM DOS/VSE and VM operating systems, and in previously supported MVS environments. The X.400 products run directly on top of MVS or OTSS and OSNS and enable an IBM mainframe to support an X.400 application.

The company's X.400 DISOSS Connection translates documents between an X.400 application and a DISOSS application, which supplies mainframe electronic mail and library services. The connection supports revisable and final-form DISOSS documents. Both X.400 products will be sold only in Europe and will be available in September 1988.

Oddly, even though IBM used the trade fair as a platform for its OSI software announcements, it chose not to participate in a CeBIT demonstration showing X.400 products from more than 10 vendors linked together on the show

floor. Participants in that demonstration were: Bull Peripherals Corp., Data General Corp., Digital Equipment Corp., International Computers Ltd. (ICL), Nixdorf Computer Corp., Nippon Telephone and Telegraph, Philips Industries, N.V., Siemens A.G., Sydney Development Corp., Xerox Corp., and two carriers, Deutsche Bundespost and British Telecom.

IBM's decision not to partake in the X.400 demonstration was even more surprising given the fact that the company participated in a similar event last year. In that demonstration, which included ICL, Bull, Siemens and Nixdorf, IBM displayed a prototype gateway between its Professional Office System automation application and X.400 applications.

Jim Cypher, an IBM spokesman, said of the decision not to participate in the demonstration, "In contrast to the multivendor demo last year when there were a half dozen vendors, this year there were 13. We would have been the 14th. We felt that the time frame — between November and January — was too short for us to do serious testing with all the other vendors."

An IBM spokesman at CeBIT added that the company felt decisions about how the demonstration would be run were being made to help vendors market their products, and not to show the technical merits of various proposals.

IBM also pulled out of another demonstration, the CeBIT Multinet, which connected 19 vendors' products using the U.S. Department of Defense's Transmission Control Protocol/Internet Protocol.

IBM was expected to take part in the demonstration, and press releases sent out a week before the show listed Big Blue as one of the participants.

Ing Helmut Schafer, director of commercial information systems at HP, said IBM gave no reason for the withdrawal and he hoped it would participate in future CeBIT Multinet demonstrations.

Schafer, the driving force behind CeBIT Multinet, said TCP/IP supplies a standard for connecting different types of systems and that "users do not have to put their purchases on hold until OSI products become widely available." □

MCI Communications Corp. SDN rate schedule

Effective as of March 1, 1987	Standard access		Special access/ standard termination		Special access	
	Call duration		Call duration		Call duration	
	Initial 30 sec.	Each additional 6 sec.	Initial 30 sec.	Each additional 6 sec.	Initial 30 sec.	Each additional 6 sec.
Mileage band:			Charge (\$)			
0 to 292	.0561	.0098	.0861	.0158	.1794	.0069
293 to 430	.0615	.0108	.0915	.0168	.1842	.0079
431 to 925	.0717	.0126	.1017	.0186	.1939	.0098
926 to 1,910	.0824	.0144	.1124	.0204	.2035	.0118
1,911 to 3,000	.0884	.0155	.1184	.0215	.2100	.0129
3,001 to 4,250	.1066	.0187	.1366	.0247	.2228	.0156
4,251 to 5,750	.1134	.0199	.1434	.0259	.2325	.0176

Correction:
In "All's calm on the VPN front," (NW, Jan. 26), a decimal error appeared in the software-defined network rate schedule for MCI Communications Corp. Above is MCI's corrected rate card. Network World regrets any confusion this error may have caused.

SOURCE: MCI COMMUNICATIONS CORP., WASHINGTON, D.C.

Global from page 1

That approach may sound extravagant, but it isn't, considering the difficulties involved in getting an international line in that part of the world, according to Jim Scarbrough, supervisor of international telecommunications with Texaco's Computer and Information Systems Department in Houston.

For Scarbrough, the need to airlift employees to reliable communications outposts is just one of the challenges he faces in running an international network. The lure of exotic locales aside, international net users face challenges domestic net managers encounter only in their darkest dreams.

Scarbrough's advice for users setting up international networks is simple: "Forget everything you have ever learned about running a domestic network."

Like Texaco, Chase Manhattan Bank, N.A. had to come up with its own solution to the problem of getting international lines. Employees at the bank's India offices used to send telexes to the bank's Hong Kong office requesting that workers there telephone them.

Chase Manhattan solved its problem in India by installing a dedicated line, a project that took two years to be approved by local Postal Telephone and Telegraph (PTT) administration authorities. Although it's not a cost-effective solution, the bank views the dedicated line as a strategic asset, said Jim Hynes, vice-president of international telecommunications for Chase Manhattan in New York.

As if line problems were not enough, telecommunications managers operating voice and data networks overseas must also contend with variations in circuit quality. And most countries have limited the types of equipment users are allowed to connect to a private net.

"Never assume you can implement a domestic solution overseas," advised Texaco's Scarbrough.

PTTs often aren't familiar with the equipment needed on a network, and getting approval for equipment involves numerous meetings with PTT officials, said Dennis Oyler, manager for international services at Boeing Computer Services in Seattle. Telecommunications managers should be prepared to discuss their system design and how they plan to use the network, Oyler said.

Lead times for service are much longer than is customary in the U.S. Hynes estimated it takes from two to four months to establish a dedicated service in Europe, and from four months to two years in the Far East and other regions.

In addition, telecommunications executives have to understand the complex privacy laws each country has established regarding what data can be transmitted across borders, according to John Macri, vice-president and director for telecommunications networks at the Bank of America National Trust & Savings Assn. in San Francisco. Macri noted that regulatory agencies in each country can provide this information.

Fortunately, PTTs throughout Europe and in Japan, Singapore and Hong Kong have come a long way in the last five years in terms of offering the types of services to which U.S. companies are accustomed. The UK, which has undergone a degree of deregulation, is the most attractive country in which to locate an international network hub, telecommunications professionals agreed. Germany, with its restrictions on equipment and services, drew the most criticism from these executives.

The Eurodata Foundation, based in London, collects information on the types and pricing of services offered by European PTTs and can be a valuable source of information on the European telecommunications scene, said Dennis Conroy, a partner in Coopers & Lybrand's Information Systems and Telecommunications Group of New York.

Because European PTTs have made so many changes in the past few years, Conroy tells international network users, "Don't assume that what wasn't available two years ago still isn't available." He recommends reevaluating network options each year.

Although the telecommunications climate has improved in Europe, developing countries remain backwaters, according to industry executives and consultants. As a result, many U.S. corporations doing business in South America run their network operations from Miami, Macri said.

Texaco, which has refineries and other operations in several South American countries, deals directly with officials of these countries rather than with the local offices of international carriers, Scarbrough said. Scarbrough is fortunate to have an employee who lived in South America for 15 years and knows how to navigate the cultural differences.

Cultivating relationships with local authorities is critical to a successful telecommunications operation, users agreed. "A key element is to establish and maintain a senior-level contact," said Hynes of Chase Manhattan.

Macri warned, however, that "you want to avoid going around your normal contacts without their knowing it. They are very rank conscious." The way to work with a PTT is to "give them the requirements as far in advance as possible," Macri said. "Make them a part of your planning process."

CALENDAR

March 10-12, Washington, D.C. — MAP/TOP User-Oriented Courses. Also, May 5-8, St. Louis, Mo. Contact: Ship Star Associates, 36 Woodhill Dr., Newark, Del. 19711.

March 11-12, Atlanta — Micro/Mainframe Connections: Improving PC Versatility. Contact: Datapro Research Corp., 1221 Avenue of the Americas, New York, N.Y. 10020.

March 12-13, San Francisco — Packet-Switching Protocols. Also, March 26-27, Chicago. Contact: X.Concepts Limited, P.O. Box 6116, St. Charles, Mo. 63302.

March 12-13, New York — Local-Area Networks: Selection and Implementation. Contact: Digital Consulting Associates, Inc., 6 Windsor St., Andover, Mass. 01810.

March 12-13, Denver — Data Communications and Networking for the IBM PC, XT, AT and Compatibles. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

March 12-13, Washington, D.C. — Managing the Data Center...As a Business. Also, March 19-20, Los Angeles. Contact: New York University, School of Continuing Education, Seminar Center, 575 Madison Ave., New York, N.Y. 10022.

March 16-17, Atlanta — Local-Area Networks, Including IBM's New Token-Ring Network. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015.

March 16-19, Boston — The First International Military Fiber-Optic and Communications Exposition. Contact: Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

March 18-19, New Orleans — Educational Seminar on T-1 Facilities and Networking. Contact: Timeplex, Inc., 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

March 18-19, Boston — Cost-Effective International Communications. Contact: *Business Communications Review*, 950 York Road, Hinsdale, Ill. 60521

March 18-20, New Brunswick, N.J. — Hands-On Troubleshooting Data Communications Systems & Networks. Contact: Data Communications Institute, 55 Main St., Madison, N.J. 07940.

March 19-20, New York — IBM's Systems Network Architecture: A Master Plan for Teleprocessing and Data Communications. Also, April 23-24, Denver. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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Contel from page 2

plained. Contel ASC will likely choose to lease some of Equatorial's excess C-band transponders, he noted.

Commenting on Contel ASC's option to buy Equatorial stock, Rahe, who is also former assistant vice-president of market planning for American Satellite Co., the company Contel acquired to form Contel ASC, said the stock purchase could spell trouble for Equatorial.

"The risk is that, if Contel ASC chooses to exercise this stock option, they'll have roughly a 20% control of Equatorial," Rahe said. "If they go into Equatorial and muddy its day-to-day operations, they could damage Equatorial."

Equatorial's financial woes are due in large measure to slower than expected sales of its VSAT networking equipment. A company official told *Network World* that Equatorial has fixed monthly costs of roughly \$2 million for such items as satellite transponder leases and building leases.

In addition to the Contel ASC aid, other help may be on the way. Equatorial is discussing unloading six to eight of its excess C-band satellite transponders to cable television heavyweight Viacom International, Inc. Such an arrangement

could mean several million dollars of additional revenue to the over-extended firm.

The new interest in Equatorial is only one part of Contel's recent complicated dealings. The company is currently waiting for Federal Communications Commission approval to merge with Communications Satellite Corp. (COMSAT). COMSAT is a major domestic satellite carrier and U.S. signatory to the International Telecommunications Satellite Organization.

Rahe said that, if the Contel/COMSAT merger goes through, the combined company could emerge as the satellite industry's premier service provider. Rahe said Equatorial's national installation and maintenance force could benefit even the merged corporate giant. "The weakness of both Contel ASC and COMSAT is in installation and maintenance. They would be foolish not to try to take advantage of Equatorial's nationwide force," Rahe said.

Contel ASC spokesman Jim Sobczak explained that a strategy for consolidating the company's facilities with the Equatorial equipment and COMSAT's satellite resources will not be decided upon until after the Contel/COMSAT merger is finalized. □

Columbia from page 4

here at Columbia," said Neil Sachnoff, director of support operations for Columbia University's center for computing activities and scholarly information. Sachnoff said the Rolm/IBM team was one of about eight major vendors to respond to the more than 30 requests Columbia sent out.

The CBX-based network is expected to reduce Columbia's future communications expenditures significantly. But because the network configuration has not yet been finalized, Sachnoff could not estimate the cost savings. "Over an extended period of time, it was more financially viable for the university to go with our own PBX in order to get additional services like data switching and new cabling, than it was to stay with Centrex and New York Telephone."

The CBX will be the heart of a sprawling voice and data network that will link buildings on Columbia's Morningside Heights campus on the Upper West Side of Manhattan.

"Although a major part of it, the CBX installation is just one of many legs of the overall project," Sachnoff said. Network plans are still being drafted by Columbia with the help of Rolm/IBM officials, he added.

In the preliminary stage, plans call for the installation of digital microwave links of local-area networks at Columbia's Lamont-Doherty Geological Observatory in Palisades, N.Y., and Nevis Labs in Irvington, N.Y., both of which are some 20 miles north of Manhattan, to the backbone data network at Morningside Heights.

The contract also called for the installation of a cable television broadband-based high-speed back-

bone data communications network between buildings, a Rolm Phonemail voice mail system supporting some 3,500 voice mailboxes, 9,500 digital Rolmphones, a new telemanagement system and T-1 links to carry voice traffic between buildings and to New York Telephone's central offices. According to Sachnoff, Rolm will need to subcontract many parts of the overall project, including the microwave installation.

"Palisades and Irvington are a significant distance from the campus. Going through the public network, in terms of ongoing costs, is more expensive than putting up our own microwave system," Sachnoff said. Because of some frequency overcrowding, current plans call for sending the microwave signal first to New Jersey and then to the two remote locations. "The original research showed we did not have a direct line of sight, but we're researching that issue again," Sachnoff said.

Sachnoff said it is still not clear which university departments will take advantage of the CBX's data-switching capabilities. But, he said, "we may replace a Gandalf [Data, Inc.] PACX system we've had for over 10 years." The university expects to provide 800 lines of data switching through the CBX II 9000AE at first and possibly expand that to 2,000 lines.

Since all offices will be equipped with Rolmphones, Sachnoff said it will be easy to provide simultaneous voice and data transmission. The CBX allows university students to connect personal computers in their dormitory rooms to mainframes across campus.

Sachnoff said the system is expected to be ready for cutover in September 1988. □

Protocol from page 2

selves with a technical or price advantage over their competitors.

Until recently, the FCC had maintained that the telephone companies had to charge separately for protocol conversion. But in a decision last month involving Southwestern Bell's Microlink II packet service, the FCC ruled that protocol conversion did not cause any "inefficiencies on the network," and therefore, the telephone company was not required to levy what would in effect be a surcharge for protocol conversion.

In a supplemental ruling to the Third Computer Inquiry, which FCC sources said is likely to be released this month, the FCC has outlined three potential methods of regulating protocol conversion.

One alternative, generally supported by the the BOCs, would remove protocol conversion from the enhanced service domain and place it within the basic service category subject to regulation. A second alternative calls for the FCC to decide if protocol conversion is an enhanced service based on the type of service.

Users groups, such as the International Communications Association and the Ad Hoc Telecommunications Users Committee, favor a third alternative under which protocol conversion would be categorized as an enhanced service subject to accounting safeguards.

"Protocol conversion is supported by network engineering," said William Adler, executive director of regulatory matters for Pacific Telesis Group. "It is easier, more efficient and less expensive to do protocol conversion as part of network services."

Joseph Timko, vice-president of AT&T Architecture at AT&T Bell Laboratories, said curbs on the carriers' ability to provide protocol conversion have had a negative effect on the growth of data networking in the U.S.

Novell from page 2

today against Novell," Clark said. "Novell has a real weak spot [with its X.25 products] in that you have to know where the information is to get at it." Banyan, by contrast, has a naming service that allows users to access a file anywhere on the network simply by asking for the file by name.

Novell, however, offers better security features by allowing users to assign different levels of security, Clark said. This capability is likely to prove important as users begin accessing remote nets via public X.25 services.

Novell's remote bridge and gateway products are based on the same intelligent communications interface and configured by software.

A single card can act as a combination bridge and gateway, Calkins said. The card supports line speeds up to 64K bit/sec and can run in either a network file server or a dedicated workstation.

The device can be used in conjunction with both public and private X.25 networks via either dial-

"The evolution of data networking has been held back because the carrier industry has been practically prohibited from fully participating because of the inability to provide protocol processing with data networking services," Timko said. "Many data networking services like X.25 are difficult to market if one doesn't have protocol conversion integrated with it."

James Blaszk, legal counsel to the Ad Hoc Telecommunications Users Committee, which represents some of the largest users in the nation, said his group favors allowing all telephone companies to offer protocol conversion as long as safeguards are in place to prevent cross-subsidization.

Blaszk said it is in the best interest of users to promote a system that provides as much competition as possible among vendors. "We argue that protocol processing, even if it is offered as an integral part of packet switching, should be deregulated," Blaszk said. "The reason being that packet switching services are not offered under monopoly conditions right now."

Representatives from the public packet-switched network, such as Tymnet/McDonnell Douglas Network Systems, Inc. and Telenet Communications Corp., vigorously oppose allowing the BOCs to offer protocol conversion and packet switching services without accounting safeguards.

Steven Bell, an attorney representing Tymnet, said classifying protocol conversion as a basic regulated service appears to be "a cynical vehicle for eliminating the competitive protections put in place by the FCC."

"This is the first enhanced service the BOCs have been allowed to offer on a non-structurally separated basis," Bell said. "As soon as they get to offer one, they want to regulate it. This doesn't bode very well for the BOCs' attitude toward other enhanced services." □

up lines or leased-line connections.

Two versions of Remote Bridge

Two versions of the Remote Bridge will be available in the second quarter. The NetWare Remote Bridge, priced at \$1,995 per network, including the communications card, supports a connection to a single remote network. NetWare Multi Remote Bridge X.25, priced at \$2,495, including the communications card, can connect as many as 32 remote NetWare-based local networks.

The NetWare X.25 Gateway, due for release in the third quarter, is also available in two versions. One version, priced at \$1,995, supports up to 32 virtual circuits or sessions on one or more remote asynchronous host computers. A second version, priced at \$2,995, supports up to 256 sessions.

Users at networked personal computers need to run an asynchronous terminal-emulation program to initiate a session on a remote host. Novell and other vendors will be offering this terminal-emulation program. □

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